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DEPARTMENT OF DEFENSE AMMUNITION REQUIREMENTS AND PRODUCTION BASE

HEARINGS

BEFORE THE

SUBCOMMITTEE ON PREPAREDNESS

OF THE

COMMITTEE ON ARMED SERVICES
UNITED STATES SENATE

NINETY-NINTH CONGRESS

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PART 2

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DEPARTMENT OF DEFENSE AMMUNITION REQUIREMENTS AND PRODUCTION BASE

TUESDAY, DECEMBER 10, 1985

U.S. Senate,
Subcommittee on Preparedness of the
Committee on Armed Services,
Washington, DC.

The subcommittee met in open session pursuant to notice, at 2:11 p.m. in room SR-222, Russell Senate Office Building, Senator Gordon J. Humphrey presiding.

Present: Senators Humphrey and Dixon.

Staff present: Ronald P. Kelly, professional staff member; Patricia L. Watson, research assistant; Lisa M. Tietge, staff assistant. Also present: Deforest Hamilton, assistant to Senator Denton; and Charles C. Smith, assistant to Senator Dixon.

OPENING STATEMENT BY SENATOR GORDON J. HUMPHREY, CHAIRMAN

Senator Humphrey. The subcommittee will come to order.

Today the subcommittee will commence its examination of military ammunition requirements, stockpiles, and production facilities.

Our witnesses this afternoon are:

Maj. Gen. Alexander K. Davidson, U.S. Air Force, Director of Plans.

Brig. Gen. Robert J. Winglass, U.S. Marine Corps, Director Materiel Division.

Dr. Jay Mandelbaum, Assistant Director for Logistics, Readiness and Sustainability Analysis.

Brig. Gen. Wayne. C. Knudson, U.S. Army, Director of Force Requirements.

Maj. Gen. Robert S. Molinelli, U.S. Army, Director Combat Support Systems.

The prepared statement of Senator Dixon will be inserted in the hearing record at this point.

[The prepared statement of Senator Dixon follows:]

Prepared Statement of Senator Alan Dixon

Mr. Chairman, I join you in welcoming the witnesses to the subcommittee this afternoon.

I am pleased that the chairman of the subcommittee is continuing our subcommittee's investigation into the munitions levels of the military services and the capability of the production base to surge and sustain munitions production in time of war.

Our subcommittee has found over the years that munitions programs are always the first programs to get cut when the budget gets tight. Well, with the conference on the deficit reduction proposals apparently concluded, the entire Federal budget, including defense, is in for a squeeze that is going to make the last 5 years look like a Sunday school picnic. Those of you in the Defense Department and those of us in Congress who think munitions programs should be protected as much as possible from the budget cutting ax are going to have our work cut out for us.

I look forward to the witnesses' testimony. I will have questions after they have delivered their prepared statements.

Senator **Humphrey**. We will start with General Knudson.

STATEMENT OF BRIG. GEN. WAYNE C. KNUDSON, U.S. ARMY, DIRECTOR OF FORCE REQUIREMENTS

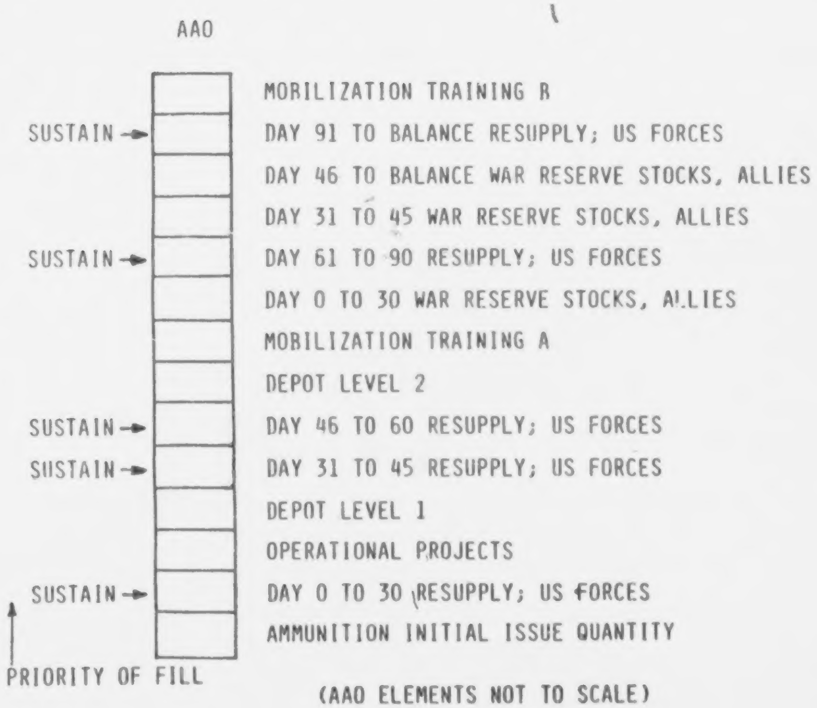
General **Knudson**. Gentlemen, I am Gen. Wayne Knudson, member of the Directorate of Operations on the Army staff. My duty is principally in the area of Army requirements. I am Director of the Army Requirements.

I have a written statement for the record. With your permission, sir, I will submit it and I would like to proceed with informal comments using four or five charts that I brought with me.

Senator **Humphrey**. Go ahead.

General **Knudson**. The acquisition objectives for the Army ammunition program are not dissimilar from objective calculations made for all kinds of weapons programs to include ammunition.

COMPONENTS OF THE ARMY ACQUISITION OBJECTIVE


AAO
MOBILIZATION TRAINING B
SUSTAIN
DAY 91 TO BALANCE RESUPPLY; US FORCES
DAY 46 TO BALANCE WAR RESERVE STOCKS, ALLIES
DAY 31 TO 45 WAR RESERVE STOCKS, ALLIES
SUSTAIN
DAY 61 TO 90 RESUPPLY; US FORCES
DAY 0 TO 30 WAR RESERVE STOCKS, ALLIES
MOBILIZATION TRAINING A
DEPOT LEVEL 2
SUSTAIN
DAY 46 TO 60 RESUPPLY; US FORCES
SUSTAIN
DAY 31 TO 45 RESUPPLY; US FORCES
DEPOT LEVEL 1
OPERATIONAL PROJECTS
SUSTAIN
DAY 0 TO 30 RESUPPLY; US FORCES
AMMUNITION INITIAL ISSUE QUANTITY
PRIORITY OF FILL

(AAO ELEMENTS NOT TO SCALE)

The Army acquisition objective, so-called, the AAO, is a calculation that is made based upon warfighting scenarios to provision for enough ammunition to fight a war for certain periods of time, for certain numbers of people for certain kinds of scenarios and then combining them.

The requirements calculation process that we use starts with a series of inputs such as: scenario; timeframe of war; duration; tactics; doctrine; U.S. forces, to include the other service forces that participate in the same battle zone—the Air Force, for instance; and the threat and the weapons that we have.

We go through a series of models starting with high resolution models that look at battles a day at a time, figure out what those battles do in consumption, and then bring that data in some lower resolution models, giving them the insight of the detailed battles.

After those wars are fought, we run them through a post processor. The post processor accounts for adding up all consumption that has taken place including kills of people who were firers, but who died in the battle before the model quit fighting.

At the end of that we come up with ammunition consumption rates for certain designated periods of a specific war. The battles that we run biennially are traditionally NATO, Southwest Asia, and Korea, those three scenarios are run independently and the results aggregated for the total consumption factors and consumption on the unconstrained requirements basis.

Here, requirements are not constrained physically; they are not constrained except by the force structure available. It is an unconstrained requirement determination such that if everyone were given the opportunity to shoot a bullet when he wanted to, the bullet is there and the preferred ammunition would be used whenever the model is run.

Senator **Humphrey**. What do you call that?

General **Knudson**. The term is AAO [Army acquisition objective]. It is distinguished from the term, authorized procurement objective, which is a fiscally constrained sub-level of the acquisition objectives; the acquisition objectives being unconstrained and for long periods of war. In the classified session we can talk about the durations of these models.

Modeling is not the same for all munitions. I have classified them in four classes. There is direct modeling.

Direct modeling is where, for instance with the main battle tank, the primary round on the main is modeled specifically so that when it sees an enemy, shoots at it and a determination is made whether he hit him, he gets credit for that. Most direct fire weapons then are modeled as direct models.

Another class is association, and I will use the same example of the tank. We do not model the coaxial machinegun that is linked to the tank main gun and shoots against personnel targets. The coaxial machinegun on that tank is given credit for shooting ammunition based on how many rounds of main gun ammunition were shot. It is associated with another thing to derive the amount of ammunition it takes.

There are some other things that are called bulk rate items. Requirements are based on things like how many people we have. Because we have so many infantrymen, they will use some quantity of pyrotechnics equipment.

We count infantrymen and every infantryman generates a requirement for so many pyrotechnics with him. The total requirement is based on the number of people and how we expect those people will use those pyrotechnics. These items are called bulk rate items.

The last class of rates are threat-oriented rates. They are air defense missiles for which we have allocated a certain amount of the enemy to be killed by that missile system; to the Chaparral, Hawk and Patriot, for example. Requirements are based on the munitions necessary to kill a certain amount of the enemy threat. Whether or not that wins the war, that is what each system is being allocated. When we look at threat-oriented munitions, a lot of those in the case of air defense are sharing the total amount of enemy threat with the Air Force and others who participate in counter air. So, the agreement is made for the Hawks, for example; you guys take this much threat, we take that much.

When I talk about an AAO, the Army acquisition objective, it also fills in priority from what I call the bottom to the top. At the bottom is the highest priority, what we call the Ammunition Initial Issue Quantity, sometimes called the combat load. That is the ammunition we put on board the tank when he goes forward to start a battle. The combat load is issued out of AAO so that the people who go to war have an initial load of ammunition.

The next element is a sustaining element. That is the first 30 days of resupply for the firers as they arrive in the battle, those that start plus those that come: Those that die no longer generate requirements. So, that is where the models come up with 30 days of resupply for everyone fighting.

The next element is called operational projects. That is an area of the AAO that does not fit into resupply because we have not modeled, let us say, South America. We have for some reason or another allocated some ammunition for some contingency. Such requirements, because they are not NATO, they are not Southwest Asia, they are not Korea, may fit into operational projects. They are prioritized in advance.

Next are depot level one and depot level two. Those two components are utilized for training unique ammunition in case we may have a problem in the production line of training ammunition. We keep in depot a certain amount of ammunition so that we can continue to train if we have some kind of a break in production of training unique ammunition rounds. This does not apply to rounds that are war reserve type, because there is a break in production for a war reserve type munition, we can use war reserve rounds to train with. For some, rounds like the current 120-millimeter tank round, the war reserve round may not be used for training. It cannot be used in peacetime, so a training round must be manufactured. In depot level one stocks we keep those rounds necessary for a minimum amount of training for 200 days.

In depot level two, we keep the rest of the rounds required for the maximum training level for 200 days.

The next increment is 31 to 45 days resupply. It is the second increment of war reserve stock and is sustaining. This provides an additional 15 days of supply for the forces in contact.

The next increment is also resupply; days 46 to 60. Then I pick up the rest of the training ammo. Then mobilization training A and mobilization training B. This is where we allocate ammunition for the forces that we would mobilize that are new entry people and train them as soldiers to go as replacements. Mobilization training A is that amount of ammunition there for the initial mobilization training requirement. The residual of the mobilization requirement is at mobilization training B.

The next increment is 30 days of War Reserves Stock's Allies, WRSA. WRSA is a program in which the United States has an agreement with the Government of Korea at the present time to provision for certain amounts of war reserve stocks for the Korean forces if they have to go to war and they do not have enough ammunition to support their requirements initially.

The next increment is again substaining war reserve for 61 to 90 days. Then another follow-on 15 days for allies in the WRSA Program followed by a package for the remainder of the WRSA requirement.

The last sustaining in a requirement would be from day 91 to the end of the sustaining requirement. In closed session I can advise you of that number.

The last at the top, moblization training B, as I mentioned earlier, is the rest of mobilization training ammunition for full mobilization of the country as we continue to bring on new forces.

Sir, I am subject to your questions. That concludes my remarks.

[The prepared statement of General Knudson follows:]

Prepared Statement by Brig. Gen. Wayne Knudson, Director of Force Requirements (Weapons Systems), Office of the Deputy Chief of Staff for Operations and Plans, Department of the Army

Mr. Chairman and Members of the Subcommittee. Good afternoon. I am Brigadier General Wayne Knudson, Director of Force Requirements (Weapon Systems) from the Office of the Deputy Chief of Staff for Operations and Plans, Headquarters, Department of the Army.

I am here this afternoon to provide information on the Army's requirements determination process for conventional ammunition. I will be discussing the Army acquisition objective (AAO), which is the Army's statement of requirements for a given item. I will cover the composition of the AAO and how its parts relate to the measurement of sustainability. Finally, I will discuss how the Army measures the meeting of its requirements; both in planning for procurement of new munitions and in accounting for existing stocks of older munitions.

The AAO is defined as the quantity of an item of equipment or ammunition required to equip the approved U.S. Army force and sustain that force, together with specified allies, in wartime from D-Day through the period prescribed in the latest defense guidance. As you can see from the attached chart (see enclosure), the AAO consists of a number of elements. While all support the equipping, training or sustaining of the force in its wartime mission, not all of them count against sustainability.

Requirements for those components of the AAO which are marked "sustain" are developed by applying expected ammunition consumption rates to the number of firing systems in the deployed force.

Expected wartime comsumption rates for ammunition are obtained from computer warfight simulations which use as input such data elements as scenario, expected us and threat forces, theater, duration of conflict, capabilities and vulnerabilities of weapon systems and doctrine and tactics of the opposing forces. The output of the simulation is a series of theater specific, time phased consumption rates for the various weapon—munition combinations modeled. Applying these rates to the expected deployment of U.S. Army forces, the sustainability requirements for the appropriate AAO packages are computed.

The first priority component to the AAO is the ammunition initial issue quantity or AIIQ. This is the quantity of ammunition which provides for the on-board load of ammunition for a weapon system and gives the weapon system the initial capability to perform its TOE combat mission. The ammunition consumption rates desribed earlier do not include any reflection of this initial issue requirement—they provide for resupply only. Use of the AIIQ component clearly separates initial issue and resupply requirements.

Once the requirements have been specified, by means of the AAO, planned procurements can be measured against the AAO to determine how well requirements will be met and what sustainability they will provide. In doing this, existing stocks of ammunition are considered. Stocks of older munitions are included, as appropriate, but not necessarily on a one-for-one basis. This is because, as time goes on, threat systems are modernized and a munition which was once highly effective against an "older" threat weapon may not be nearly as effective against a "newer" one.

There are other factors which can impact the AAO for a given item and the sustainability provided by on-hand stocks and planned procurements of munitions. Changes to decisions on the fielding of weapon systems may have this result since the AAO is based, in large measure, on the number of systems fielded and requiring ammunition support. If fielding of a new system is accelerated, more ammunition is required to maintain sustainability at a given level. As an older system is phased out, existing munitions stocks for it may provide increasing sustainability to those systems left in the force.

I have discussed the way the Army states its requirements, how the sustainability requirements portions of the AAO are determined and how the sustainability afforded by munitions stocks are measured. Major General Molinelli will continue now with the requirements process as it is translated into a budget requirement.

Senator HUMPHREY. General Knudson, what happens to this figure, the AAO after you work it up? Where does it go and what happens to that figure afterwards?

General KNUDSON. The Army acquisition objective is entered then into the programming and budgeting cycle. We work within defense fiscal guidance allocating procurement amounts against the various AAO's and strive to achieve what is in defense guidance, published by the Department of Defense, as the objective for achieving war reserve stocks throughout the program period, the 5-year period that we build all the POM's from.

Senator HUMPHREY. Who is going to address that next phase of the process?

General KNUDSON. General Molinelli, sir.

Senator HUMPHREY. Why don't you go ahead, General Molinelli. After your testimony we will have to break for a time to go and vote.

STATEMENT OF MAJ. GEN. ROBERT S. MOLINELLI, U.S. ARMY, DIRECTOR, COMBAT SUPPORT SYSTEMS

General MOLINELLI. Mr. Chairman, I am Bob Molinelli. I am in Research, Development, and Acquisition. I am the Director of Combat Support. I do the planning, programming, and budgeting for all of the Army ammunition accounts.

I will submit my statement for the record if you will agree to that, sir, and make a couple of quick remarks here.

Senator HUMPHREY. Yes.

General MOLINELLI. I should like to address to you the complexity of putting together the ammunition program. We procure approximately 150 Army lines and about 150 lines for the other services that are currently active lines and then we have another 200 or 300 lines that are inactive that do not require that intense management.

This is a kind of living, breathing thing because of the number of lines and the plants that are involved. We must look at components, on-hand inventories, fluctuation in unit cost, production rates, plant workloading, and executability. Then we see a number of changes that go through the planning, programming, and budgeting cycle that lead us to the final budget submission.

I am sure you are aware after the budget submission you see a number of changes in the ammunition in terms of reprogramming efforts.

Development Process
Army develops POM (Jan–May)
Submit to OSD (May)
DRB review (Jun/Jul)
OSD response to POM (Aug)
Budget submit to OSD (Sep)
OSD/OMB budget hearings (Oct)
OSD issues program budget decision (PBD) (Nov)
Army RECLAMA to PBD (Nov)
OSD issues final PBD (Dec)
Presidential budget to Congress (Jan)
GAO/Congressional review (Feb–Oct)

This is the way we develop our program. We submit our program objective memorandum which we build during January through May of each year. As I said, it is a living, breathing document in terms of ammunition.

We submit it to the Secretary of Defense in May. The Defense Resources Board then reviews it in June and July. They respond to our submission in August and the budget submission is then sent in to the Secretary of Defense Office in September.

We then go through a number of hearings with different analysts in the Office of the Secretary of Defense. The Secretary of Defense issues Program Budget Decisions which we may or may not agree with.

Should we choose not to agree with them, we reclama them in November and we get our final decision in December. The budget is then sent to Congress in January which reflects all of those changes that occurred during the OSD review. Then we undergo GAO and congressional review February through October or later in some cases.

I am now subject to any questions.

[The prepared statement of General Molinelli follows:]

PREPARED STATEMENT OF GEN. ROBERT S. MOLINELLI

Mr. Chairman and Members of the subcommittee: It is a pleasure to appear before this subcommittee today to discuss the Army's ammunition program.

This afternoon, in open session, I will briefly describe the process of how the Ammunition Budget is developed. In closed session, I will address the ammunition program specifics which will include readiness/sustainability, days of supply, and funding profiles.

Once the ammunition requirements are developed, as BG Knudson has previously addressed, procurement funding profiles must be developed to support these needs.

From January to May each year the Army develops the 5 year ammunition procurement program, the initial program is developed at our field commands (AMCCOM/ARDC), many elements must be considered in developing the procurement profiles, for example, on hand inventories, unit costs, production rates, plant workloading, executability, etc.

Once the program has been developed by our field commands, the program is forwarded to the Department of Army staff for review and final approval. Tough decisions must be made at the Department of Army reviews. The Army prioritizes all of its needs within limited total obligation authority funding. As we proceed through this process, priority Army accounts receive allocation of funds; however, in most cases the programs end up with "unfunded" shortfalls. This is definitely the case in ammunition.

The program does have some shortfalls, particularly in meeting our total training requirements, building adequate war reserve inventories, and financing production base voids in support of mobilization requirements. Within the limited resources, we believe that the Ammunition Budget before Congress is an austere but balanced program that adds to our war reserve stocks and provides the minimum assets for training.

In May, the Army forwards the program, which is referred to as the "Program Objective Memorandum (POM)", to OSD for approval.

During June and July, the program is reviewed in depth by the OSD staff, final decisions on the program are then made by the Defense Resource Board (DRB) committee.

In August, the Army receives the OSD response/position on the POM.

At this point in time, the Army makes the necessary changes to the program based upon the OSD response to the POM along with any "fact of life" changes that may have occurred since the initial program was developed in January.

In September, the Army forwards the initial budget request to OSD and OMB for review. During October, the Army appears before joint OSD/OMB budget hearings to defend the program. In October, OSD issues a Program Budget Decision (PBD) which approves and/or modifies the Army budget request. Should the Army disagree with any of the OSD adjustments, a reclama is submitted back to OSD for reconsideration, after review of the Army reclama, OSD then issues their final decision on the budget in December.

In January the budget is submitted to the President/Congress.

From February through October, or sometimes into the next year, the budget is reviewed by Congress and GAO.

This concludes my "open session" remarks. Later, in closed session, I will address "specifics" on the ammunition program.

At this time, if there are no questions, I would like to introduce BG Robert W. Winglass, Director, Materiel Division, Deputy Chief of Staff of Installations and Logistics, Marine Corps.

Senator HUMPHREY. I want to ask some questions at this point.

Let us talk in some detail about what happens when the AAO first is applied to the POM process.

What happens then?

General MOLINELLI. I will say to you that generally across the line it is our objective to fund the initial issue quantity, the day zero to 30 resupply U.S. forces, operational projects and depot level one training, which is a minimal ammunition required for training.

As our fiscal constraints reflect reality, that is the limit of the funding we have been able to put against the ammunition program for a number of years.

Senator HUMPHREY. Let us stop right there. I apologize for having to interrupt and draw out this hearing, but there is no controlling it.

I will be back as quick as I can.

[Recess.]

Senator HUMPHREY. General Molinelli, in applying the funding constraints, how do you choose to draw the line?

Did you say you take the first three or first four?

General MOLINELLI. I believe it is the first four.

Senator HUMPHREY. On what do you base that decision?

General MOLINELLI. We base that decision primarily on the funding constraints. We look across the board to try to determine what level will provide us with minimum training ammunition, operational projects, and the 30-day resupply. This is generally speaking now.

I will show you later in the classified session the different levels of days of supply which have been reached through changes in requirements, changes in authorized acquisition levels, and so on.

Senator **Humphrey**. So, you fully fund the first four boxes?

General **Molinelli**. Yes, sir.

Senator **Humphrey**. Then you partially fund the boxes above that?

General **Molinelli**. We have not been able to fund beyond that level for most of our line items for a number of years.

Senator **Humphrey**. Zero?

General **Molinelli**. That is correct.

Senator **Humphrey**. All of the above are zero?

General **Molinelli**. Yes.

Senator **Humphrey**. What does that tell us in open session about resupply after day 30?

General **Molinelli**. It tells you that we are very dependent on our production base. We are dependent on substitute items of ammunition.

One thing that was not covered by General Knudson is when we have a new item of ammunition that replaces the other round, then we must rely on the previous stocks that we have of the oldest, less preferable type of ammunition to build to a reasonable number of days of supply.

I do not mean to infer, Mr. Chairman, that we only have 30 days of supply funding to that first line on that chart. That would be unrealistic and I can show you in closed session different levels of supply for different types of ammunition.

Senator **Humphrey**. Inasmuch as we have not provided any funding at all for those upper boxes—for how many years? Do you know that figure?

General **Molinelli**. There are some lines where we have funded up to the 45 day level, sir. I would hazard a guess that the funding, and, very honestly, Mr. Chairman, it is a guess, that the funding beyond that probably was not done since we came out of Vietnam because of constraints on our total obligational authority.

Senator **Humphrey**. What about the shelf life of these conventional munitions?

They are not replaced and rotated from time to time, and apparently they have not been to any meaningful extent. Then these supplies represented by the upper boxes are continually declining in number in terms of usable weapons?

Is that a reasonable conclusion?

General **Molinelli**. The shelf life of the weapons or the munition is dependent on the specific type of munition. Some have greater or lesser values of shelf life.

Reasonably, I can say to you that we do use the older weapon or munition in a training mode to expend it and keep a newer product on the shelf. Now, this is not done in some cases because our training ranges will not accept certain types of wartime munitions.

For instance, in tank ammunition there are some tank munitions even though an older weapon, I cannot use because they go beyond the ranges that we physically own.

Senator HUMPHREY. What are the implications of the failure to fund year after year the requirements.

General KNUDSON. I think, sir, the prioritization of the ammunition allocation comes back over to my side of the house.

First of all, I think the 30 days is a principle that I would like to ensure we understand. We have a principle which applies when we are putting out a new system, let us say the M1A1 tank. This new tank requires a new caliber of ammunition. Therefore, we do not have existing ammunition stocks for the tank.

Our principle is that we will not field the weapon unless we can provision for it on a tank-by-tank basis the combat load that it requires and 30 days of war reserve ammo for the tank.

So, for every tank battalion we field with M1A1, we will not field that battalion unless we have that much ammo available for it.

The second area that we get into is in the preferred ammunition items. All the ammunition systems and missile systems are under a lot surveillance program in which we are discerning the degradation rates of those lots and making choices over time whether or not, based on lot surveillance, we should rehab this lot or dispose of the lot or can we consume the lot in training, bearing the burden that 3 out of 10 are poor.

In the allocation, though, of preferred munition rounds, I would prefer to have all brand new M833 tank rounds for the 105, but I have a lot M774's. As a matter of fact, I have a large quantity of 105 tank ammo that is less than the preferred. It is effective, but to a lesser degree than my preferred rounds. So, I allocate a value to it. If my new round is 1.0 then my old round is 0.7, or something. So, I allocate a percentage value to the old rounds. I combine the old rounds with the new and get increased sustainability, considering the older rounds at a lesser value and adding the new production rounds.

Now, the 30 days of supply principles also affects my work. Because we do find a better round to produce next year than this year. We do not try to buy out the entire AAO of one specific round. We buy about a third of it. By that time somebody has come up with a better long rod penetrator, or something, and you should go to production of the better round.

So, in many cases, fulfillment of the procurement may be only one third of the AAO because by then there is something better that should be procured.

Senator HUMPHREY. Are you suggesting that the shortfalls that we know exist from day 30 outwards are basically caused by forebearing to address those in the belief that better munitions are coming?

General KNUDSON. Some of that.

Senator HUMPHREY. To what extent is that? Minor or major? It must be minor?

General KNUDSON. You have to look at it by certain munitions. I do not believe the tank round bears that burden. We always produce the best available round trying to get toward an acceptable level of sustainability of the best round available for the initial period of the conflict.

Senator HUMPHREY. What is the net of all this discussion? How would you characterize the trend in the stockpiles from day 31 outwards?

We have not funded them to any meaningful degree, have not funded at all after day 45, have not funded much after day 30.

What is the net of all this? What has been the trend in these stockpiles?

General MOLINELLI. Mr. Chairman, if I could take that question, I will provide you specifics in the closed session.

In the open session I can state to you in the fiscal year 1986–1990 submission, going back to about 1982, that we are increasing days of supply in most all munitions. We still have dramatic shortfalls.

Senator HUMPHREY. I do not understand. You said a moment ago we have not provided any funding basically from day 31, maybe a little bit. Not at all from day 45.

Did I understand that correctly?

General MOLINELLI. That is correct. We have not provided any funding beyond the first four levels for most items, the way we compute that authorized acquisition objective for the munitions that we are procuring now.

However, as General Knudson stated, we must realize mostly we are buying modern munitions. We still have an inventory of substitute items which are additive to what we have procured here.

So, in a case where we have a program to procure the first 30 days of a new item, we also have the substitute munition which provides an additional 20 days of supply.

The aggregate of that is about 50-some days of supply.

Senator HUMPHREY. We will get into it in detail in closed session.

Gong back to the start, once the authorized acquisition objective is submitted to the Department of the Army by General Knudson—do you submit it?

General KNUDSON. Yes.

Senator HUMPHREY. Once you submit it to the Department of the Army, after that is there any reference to the AAO, any reference to the objective that is factored by budgetary considerations?

Is that correct?

General MOLINELLI. Yes, sir. General Knudson submits the AAO and along with that he prioritizes our procurement programs or the Deputy Chief of Staff for Operations does through a series of meetings with our four-star leadership. They prioritize all the procurement programs in the Army.

Our piece of that is Procurement of Ammunition. Army is then given a planning and programming funding figure. I take that and I lay that against ammunition requirements on hand inventories and productions capabilities with the objective of trying to reach those first four levels and still produce at an economic rate.

The objective is to produce at an economic rate. We have some programs running at minimum sustaining due to their low priority. Running programs at mimimum sustaining rates costs from 9 to 20 percent more than running at economic rates. Programs running at minimum sustaining rates have been decremented in order to fund a higher priority program that General Knudson stated.

Senator HUMPHREY. We attempt to produce at an economic rate on the one hand.

On the other hand, we do not put any money into improving the production base. So, aren't we in a vicious circle?

On the one hand we justify cutting down the authorized acquisition objective because it cannot be produced efficiently.

On the other hand we do not do anything about improving the efficiency of the line. So, it just chases itself the whole time.

General **Molinelli**. Senator, I agree with your observation. We have attempted to program for an increase in facilitization and improvement in the production base every year.

However, due to the fiscal constraint, it has fallen out of the program year after year.

Senator **Humphrey**. Whose decision is that?

General **Molinelli**. It is, in effect, a decision of the Army leadership. It is a corporate decision based on prioritization of other things.

Senator **Humphrey**. Specifically, at what level does that fall out year after year?

General **Knudson**. The four-star review we conduct every year at this point in time. We bring the principal four stars of the Army and show them what we have for resources and what we have for programs. If we have more programs than resources, we prioritize where to make cuts in the programs.

The modernization of the production base—there are two ways it is handled. We do dedicate ourselves to certain facilities put up in a priority that have come to be just compelling to modernize.

There are special programs that take care of certain things like whole ammunition programs, and so on. They are required and we protect them.

There are other pre~~ferred~~ modernizations for efficiencies that, if we got them in and 5 years of production, they pay for themselves. The problem is we cannot hold the production rates up to get them paid for so they do not qualify to pay for themselves because we cannot get the rate up there.

So, these disqualify and I set them aside and do not get an across-the-board modernization program going.

Senator **Humphrey**. You say that decision takes place about this time of the year?

General **Knudson**. It starts principally at this time of the year, sir, as we submit to Defense the 1987 budget in this case and right behind it will come the build for the 1988 POM starting in January.

This is a key prioritization window for most of the services, I assume. I know it is for the Army.

Senator **Humphrey**. Dr. Mandelbaum.

Dr. **Mandelbaum**. I will ask General Winglass to provide the Marine Corps testimony.

STATEMENT OF BRIG. GEN. ROBERT J. WINGLASS, U.S. MARINE CORPS, DIRECTOR, MATERIAL DIVISION

General **Winglass**. Thank you, sir.

We have three marines here with us today, two captains who it will be my privilege to introduce in just a moment. Our planning is to very briefly in an unfettered and uncluttered way explain how we go through our requirements process which is in some way similar to what has been described by the Army.

Later on in the closed session I think you will find interesting our efforts to, in fact, attain the levels that have been set for us and the guidance that has been provided for us by higher authority.

I also have an opening statement which, subject to your concurrence, will submit for the record.

Senator HUMPHREY. Fine.

General WINGLASS. Without further delay, I will introduce Capt. Richard Gough. Richard is in fact in the ammunition requirement programming business over in the Plans and Programs Office, Headquarters, Marine Corps. It is within the context and framework of that structure where marine requirements are determined and established.

Later we will come back to discuss requirements concerning the procurement side of I & L.

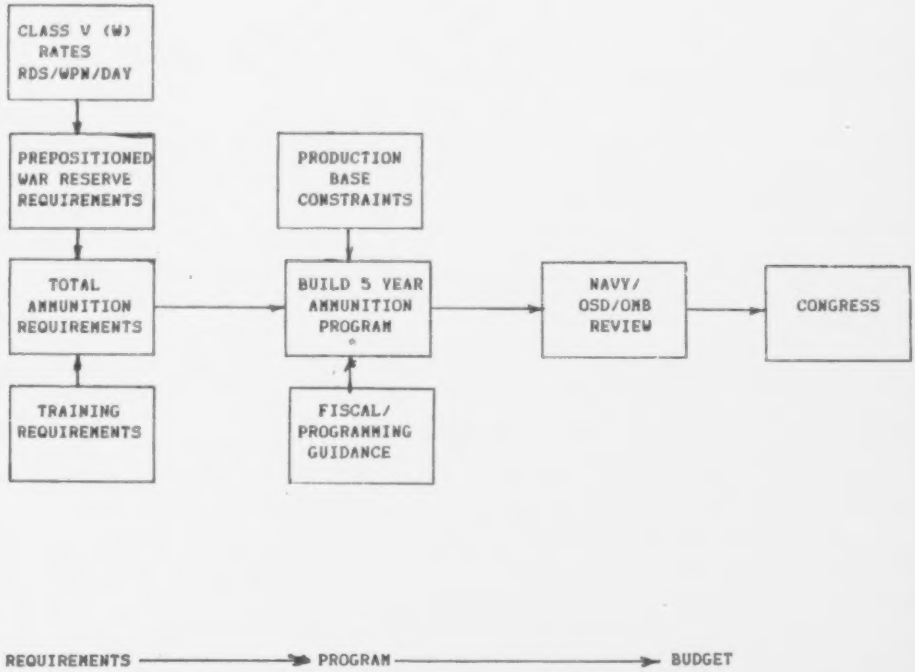
In both cases I will briefly summarize what has been said.

Senator HUMPHREY. Fine.

STATEMENT OF CAPT. RICHARD GOUGH, U.S. MARINE CORPS, PLANS, POLICY AND OPERATIONS DEPARTMENT

Captain GOUGH. Mr. Chairman, I am Richard Gough. I am here to describe the overall Marine Corps ammuntion requirements determination process. My briefing will be organized in a tap-down manner. I will first describe the general process and then work my way down to the micro level, or level at which we determine our expenditure rates.

PROGRAM DEVELOPMENT PROCESS



CLASS V (W) RATES RDS/WPN/DAY

PREPOSITIONED WAR RESERVE REQUIREMENTS

TOTAL AMMUNITION REQUIREMENTS

TRAINING REQUIREMENTS

PRODUCTION BASE CONSTRAINTS

BUILD 5 YEAR AMMUNITION PROGRAM

FISCAL/ PROGRAMMING GUIDANCE

NAVY/ OSD/OMB REVIEW

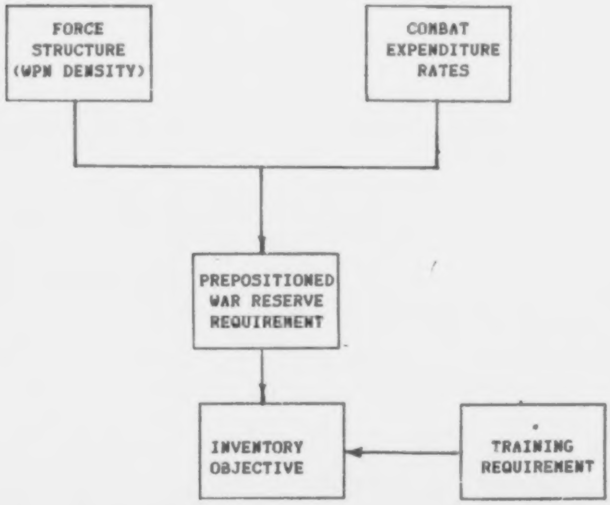
CONGRESS

REQUIREMENTS → PROGRAM → BUDGET

As you can see from this slide, program development is a multistep process. At the most basic level are program requirements primarily consisting of pre-positioned war reserve requirements and training requirements.

After consideration for production case constraints and fiscal and programming guidance, we build a 5-Year Ammunition Program. After NAVCompt, OSD and OMB review, this program submitted to Congress as part of the President's budget.

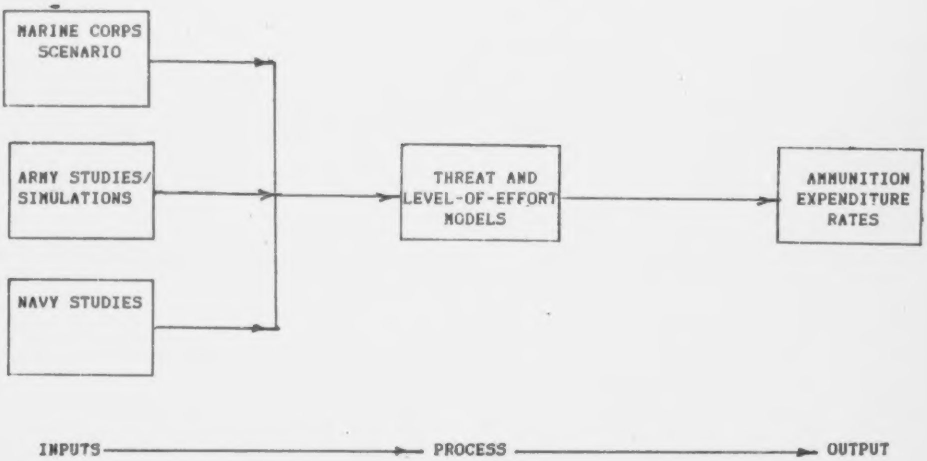
INVENTORY OBJECTIVE DETERMINATION


FORCE STRUCTURE (WPN DENSITY)
COMBAT EXPENDITURE RATES
PREPOSITIONED WAR RESERVE REQUIREMENT
INVENTORY OBJECTIVE
TRAINING REQUIREMENT

The Marine Corps total ammunition requirement is called the Inventory Objective. This objective is composed of two parts, training requirements and prepositioned war reserve requirements. The training requirement is primarily derived from historical data and professional judgment applied to an approved list of users.

The prepositioned war reserve requirement which comprises the majority of the Inventory Objective (or total requirement) comprises practically 85 percent of the objective. The prepositioned war reserve requirement is the result of the application of expenditure rate against our force structure.

EXPENDITURE RATE DEVELOPMENT


MARINE CORPS SCENARIO
ARMY STUDIES/ SIMULATIONS
NAVY STUDIES
THREAT AND LEVEL-OF-EFFORT MODELS
AMMUNITION EXPENDITURE RATES
INPUTS
PROCESS
OUTPUT

Prior to 1982 the Marine Corps generated expenditure rates based upon historical data and professional judgment. In 1982 we contracted the development of an analytical model to help develop quantitative and qualitative data.

The objective of the model is to determine expenditure rates for a 180 day "Most demanding" scenario. This is an amphibious operation with subsequent operations ashore. The scope of the model includes all non-nuclear class VCW ammunition in the Marine Corps inventory or programmed to be in the inventory throughout the 5-year defense plan.

It is assumed that there will be availability of Navy and Marine close air support and naval gunfire. It is also assumed that the Marine Corps will operate independently in a "most demanding" scenario and that there are no ammunition restrictions due to logistics constraints.

Senator HUMPHREY. What does that mean?

Let me interrupt you there.

What does it mean no ammunition restrictions due to logistical constraints?

Captain GOUGH. For theoretical requirements determination, it is necessary to determine pure or absolute requirements.

As you can see, there are three primary sources of input to the model. The Marine Corps scenario provides a theoretical basis for our model. It provides us with the red and blue forces we expect to encounter, and with weapons densities and environmental factors.

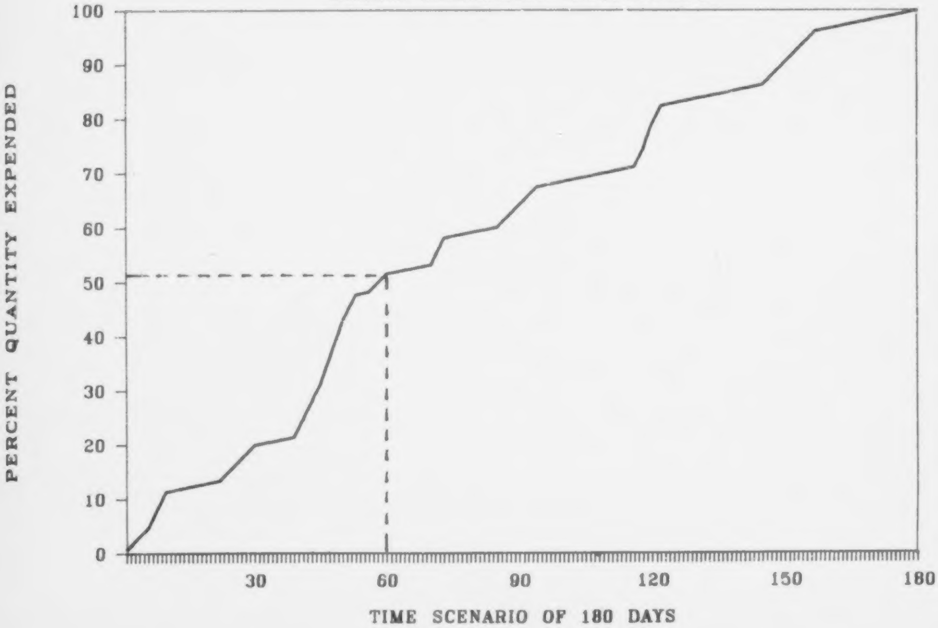
The second principal input is Army studies simulations, which provide among other things, probability of kill data and troop attrition overtime.

The third input source is Navy studies. From these studies we get potential casualty projections, contribution of naval gunfire, and contribution of close air support.

I might back up. I should mention this portion of the briefing has to do only with class V(W) ammunition items of ground ammunition. Air ordance requirements are handled separately through Navy models.

The methodology employed by the model separates ammunition in two categories, threat and level of effort. Threat ammunition for example might be air defense missiles as they are assumed to be target limited.

Level of effort, ammunition on the other hand, is assumed to be shooter limited. An example might be M-16 rounds.



UNITED STATES MARINE CORPS

COMBAT AMMUNITION EXPENDITURES

This slide provides a summary of the projected combat ammunition expenditures over the 180-day scenario period.

On the vertical axis, is the percent of quantity expended and on the horizontal axis is time. This graph reflects projected intensity from our model.

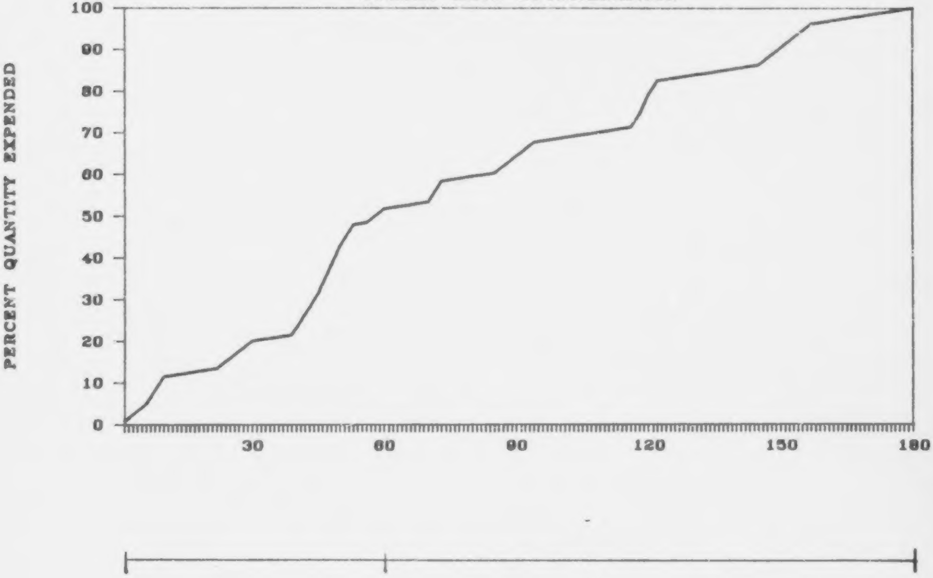
You might notice that in the beginning the intensity is greater. In other words, by 60 days we expend over 50 percent of our total expendable ammunition. This is consistent with what one might expect to find in an amphibious operation.

In addition to this overall expenditure, we have factored in miscellaneous expenditures and allowances. Those expenditure allowances are for initial loads, zeroing and registration and for intratheater logistics losses.

Therefore, the total expenditure is equal to; the number of rounds fired at target, plus rounds for basic allowance, zeroing and registration and rounds for logistic losses.

UNITED STATES MARINE CORPS

COMBAT RATE DETERMINATION



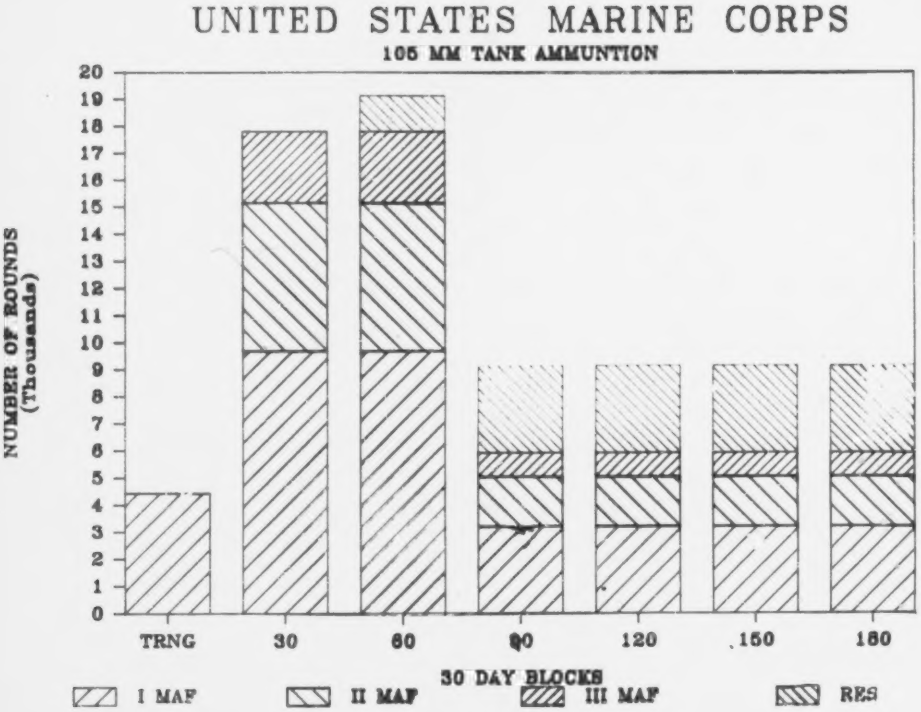
ASSAULT =
#EXPENDED/2/#WPNS

SUSTAINING =
#EXPENDED/4/#WPNS

In order to move from the theoretical to application it is necessary to determine expenditure rates. Expenditure rates are determined by converting expenditure totals to assault or sustained rates.

The assault rate is derived from the expenditure that would result from D to D+60. It is determined by dividing the total expenditure for a round type by two, times the number of weapons initially deployed.

Similarly, sustaining rates are also developed by dividing the expenditure for a round type from D+61 to D+80 by four times the number of weapons initially deployed.



This is a graph of 105-millimeter tank ammunition requirements. It provides a sample of how we apply the rates to the force structure to determine time phased total inventory requirement.

You see on the left-hand side the training block. This is training ammunition for weapon proficiency as well as mobilization requirement.

As you move across 30 day blocks, you can see that the highest expenditures come in the first 60 days. This is the result of taking assault rates I described previously and apply them against the force structure (or weapon densities) in each of the three active MAF's, and in the case of the 60-day block, against reserve force structure, which we expect to employ at that point.

The following four blocks of 30 days are determined by applying sustaining rates against the force structure (or weapon density) of three MAF's, as well as reserve forces.

At this point I will turn the briefing over to General Winglass for a summary.

General Winglass. If I might have the chart back for a moment. I think it is very important to your deliberations and certainly is important to us.

Training is in fact included right up front because we believe we have to maintain a readiness level of the individual Marine, whether he be a tanker or cannoner, or whatever. That is provided.

These levels are also taking into account the entry into the conflict in this example we show. We did this intentionally to show you the impact of the U.S. Marine Corps Reserve into the projected conflict.

There are forces on the battlefield during this 30- to 60-day interval. The entire inventory in this case of tanks is not there, but some of them are there. So, requirements established are included in the 60-day level.

Then the larger activity of the reserve establishment is carried out to the balance of the 180-day profile. Meanwhile, why is one MAF larger than another? In particular, first MAF has a greater number of tanks than does the second, than does the third. You will see the shift in terms of levels of activity.

It really comes down to about a third of the sustaining level as it was at the intense level. The bottom line is that ammunition is very, very important to the Marine Corps. We have people like Rich who are working daily to calculate these requirements. We take advantage of the information available to us, made available to us by our sister services and putting those things into our calculations.

We think we have a very reasonable expression of need. We will show you, sir, in the next session how we do against that stated for stipulated requirement.

Senator HUMPHREY. Thank you.

Gen. Alexander Davidson.

STATEMENT MAJ. GEN. ALEXANDER K. DAVIDSON, AIR FORCE, DIRECTOR OF PLANS

General DAVIDSON. Mr. Chairman, it is my pleasure to provide for you and for the public record a presentation on how the Air Force determines its conventional air-to-air and air-to-ground munition requirements.

I would like to set the stage with a brief overview of the Air Force's approach to determining these requirements and then Colonel Carter, one of my munition planners, will brief the details in the open session and munitions sustainability posture in the closed session.

I will also be available to respond to your questions, of course, after both of these sessions.

First of all, I would like to emphasize the Air Force's commitment to improving our combat capability by supporting a strong research development and procurement program for more effective munitions.

The commitment is evident, I believe, by the growth in our munitions procurement from under $500 million in fiscal year 1981 to almost $3 billion in the fiscal year 1986 President's budget.

The Air Force method for computing munitions requirements is a systematic process that every year brings together the wartime user and developer and headquarters planners whose job it is to support the Secretary of the Air Force and the Chief of Staff in their responsibility to organize, train and equip forces.

In August I chaired the fourth annual General Officers Air Force Armament Investment Strategy Conclave where the Air Force general officers representing the warfighting commanders, the development community and the headquarters planners gathered for 2 days to develop a high level consensus on our munitions program.

The process actively involves the combatant and supporting commands in developing the best assumptions, methodology and data necessary for the annual determination of our munitions requirements.

The combatant commands, including U.S. Air Forces in Europe [USAFE] PACAF, our Pacific Command, SAC, TAC, the Alaskan Air Command and ADCOM established the military goals necessary to support our national objective, provide the operational plans and describe the planned employment tactics.

Air Force System Command accomplishes the analysis necessary to predict the weapons effectiveness and delivery aircraft attrition.

Headquarters and command and intelligence personnel work together to provide the best possible estimates of the threat we face.

Finally, the contribution of the allies and other services are estimated and used to set an upper bound for Air Force objectives.

I would like to stress that we do not plan our weapons requirements to be able to neutralize all the threat by ourselves, but rather in concert with the other services and the allies. These inputs are used during an annual munitions planning conference at Air Force Headquarters where planners from each combatant command work with our Air Force Headquarters planners to combine their individual conventional munition requirements into one integrated overall Air Force requirements.

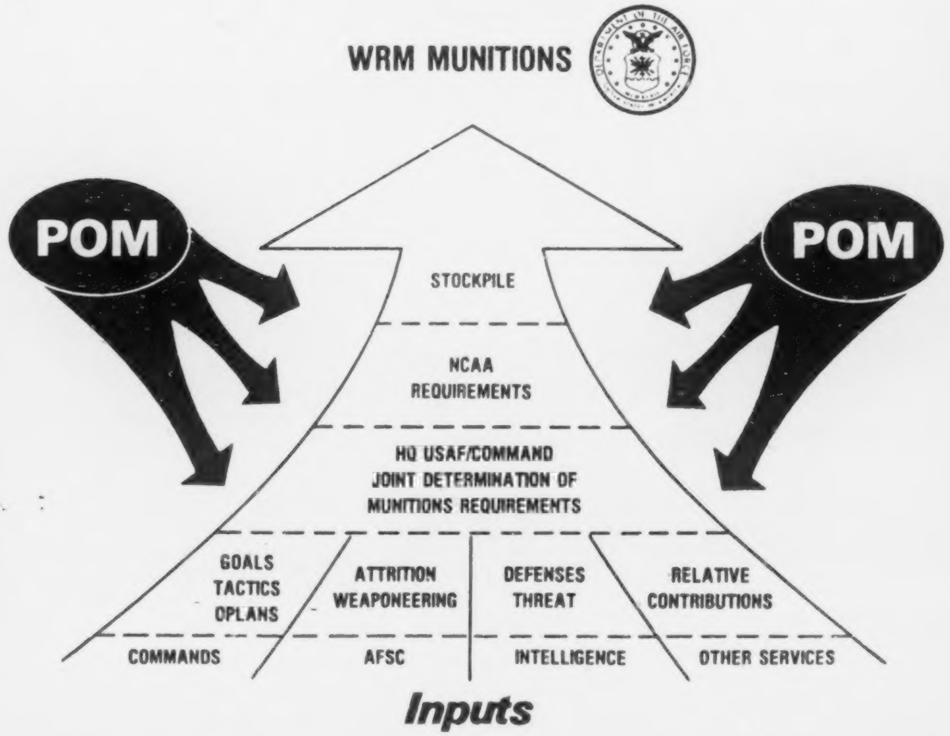
These requirements form the basis on which the Air Force builds its munitions program. Due to fiscal constraints, we are unable to fund all the munitions programs at a level or at a rate we require.

However, with that said, we feel that the President's budget represents a reasonable balance in the Air Force programs within the available funding. We know that our requirement process is not perfect and we are continuing in our efforts to improve it.

However, prediciting the major events and uncertainties of future conflicts will never be an exact science. I feel that the methodology and involvement of the user, the developer and planner in our requirements process combine to develop requirements that are reasonable and that are providing the type of munitions inventory that we need to maximize the effectiveness of our forces.

With your concurrence, Lieutenant Colonel Carter will now brief the details of the munitions requirement process used to determine weapons needed to equip our forces.

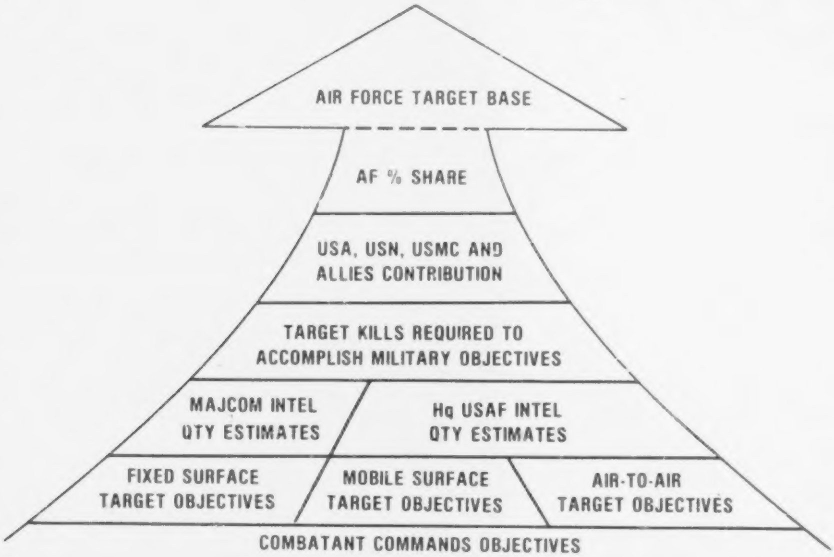
STATEMENT OF LT. COL. LARRY CARTER, U.S. AIR FORCE, MUNITION PLANNER


WRM MUNITIONS
POM
POM
STOCKPILE
NCAA REQUIREMENTS
HQ USAF/COMMAND JOINT DETERMINATION OF MUNITIONS REQUIREMENTS
GOALS TACTICS OPLANS
ATTRITION WEAPONEERING
DEFENSES THREAT
RELATIVE CONTRIBUTIONS
COMMANDS
AFSC
INTELLIGENCE
OTHER SERVICES
Inputs

Colonel CARTER. As General Davidson pointed out, our process actively involves the combatant and supporting commands to determine all the assumptions necessary for munitions requirements determinations. Through the planning, programming and budgeting system we determine how much we can buy which ultimately determines the war reserve stockpile.

I will go through the assumptions and methodologies used in that process.

TARGET BASE


AIR FORCE TARGET BASE
AF % SHARE
USA, USN, USMC AND ALLIES CONTRIBUTION
TARGET KILLS REQUIRED TO ACCOMPLISH MILITARY OBJECTIVES
MAJCOM INTEL QTY ESTIMATES
Hq USAF INTEL QTY ESTIMATES
FIXED SURFACE TARGET OBJECTIVES
MOBILE SURFACE TARGET OBJECTIVES
AIR-TO-AIR TARGET OBJECTIVES
COMBATANT COMMANDS OBJECTIVES

Inputs

First of all, we determine requirements to support only those theaters called for in defense guidance.

Next we determine the Air Force share of the target base. To do that, we determine the Air Force objectives using the combatant commander's input.

Next we determine the percentage of those type targets the combatant commands have identified are necessary to kill to accomplish these military objectives.

Then we subtract from that the percentage we can expect the allies and other services to contribute. The remainder then becomes the Air Force share.

We do not attempt to kill all the targets in all the theaters.

Senator HUMPHREY. Permit me to interrupt.

Is there any consultation with the other services to compare notes on the share of each service?

Colonel CARTER. Yes, there are informal contacts among the services at the action officer level. We have two programs. One, established by the Chiefs of Staff of the Air Force and the Army which will develop a joint base target for this purpose. It is currently underway and making good progress.

Next, an effort has been initiated by JCS to look at each service's shares of the air threat. So, there is progress being made on joint coordination of the target shares at this time, while in the past it has been informal between the action officer level.

Senator HUMPHREY. Are the shares agreed to among the services?

Colonel **Carter**. Sir, at this time the estimate of the contribution of the other services and allies is an Air Force in-house estimate. The process I told you about is for formalizing those estimates. We do not feel that our estimates are currently out of sync with the other service's positions on what they contribute.

General **Davidson**. Mr. Chairman, this has been a long-term effort. The question is frequently brought up and there have been many, many efforts to try to get joint cooperation in a more formalized program.

Frankly, we are very pleased that there are currently two ongoing programs that will formalize the process.

Senator **Humphrey**. That looks like the stage of the process where you make it all look nice.

General **Davidson**. Yes, sir. I will be the first to admit that is true.

However, we felt that we had to have a starting point. We made quite a number of attempts over at least the last 5 years I am aware of to get some sort of concurrence. We were unable to, so we more or less took the bull by the horns and put a mark up there to start with.

We are more than willing to discuss those distributions with all the services. I think these programs that Colonel Carter just spoke of will result in that.

Senator **Humphrey**. Let me pursue this a little further.

Are any of the other commands represented here in a position to talk about this stage of the process, the determination of the shares of the respective services?

General **Knudson**. May I make some remarks?

The Army and the Air Force run annually—the model we run in the Army for war reserve factors has as one of its players Tactical Air Command. Within that model the first 30 kilometers of the enemy terrain where we have close air support being provided and we also have field artillery reaching in that direction, the TAC, and the Army have an official model which is running and we are measuring, sharing, and we are killing uniquely what is going on.

The data from that goes to each service then as to what the other guy contributed; therefore, my share is working quite well.

A second thing I think was not picked up that is being done by the Defense Department and reported to the Congress is called the DOD antiarmor master plan in which this year will be the second submission of the Defense Department of specific efforts to better focus on the antiarmor munitions family of the services.

As was mentioned earlier, we wish we had one giant model that would fight the whole field in Europe in all functions. We do not have that class of work finished, but we have been asked by the Congress to pursue that work and the Defense Department is working with the services to build a more robust multifunctional model that will handle a sort of theater level of war analysis so that we can observe with consistent factors and consistent threat the contributions of each service as we go through the scenario.

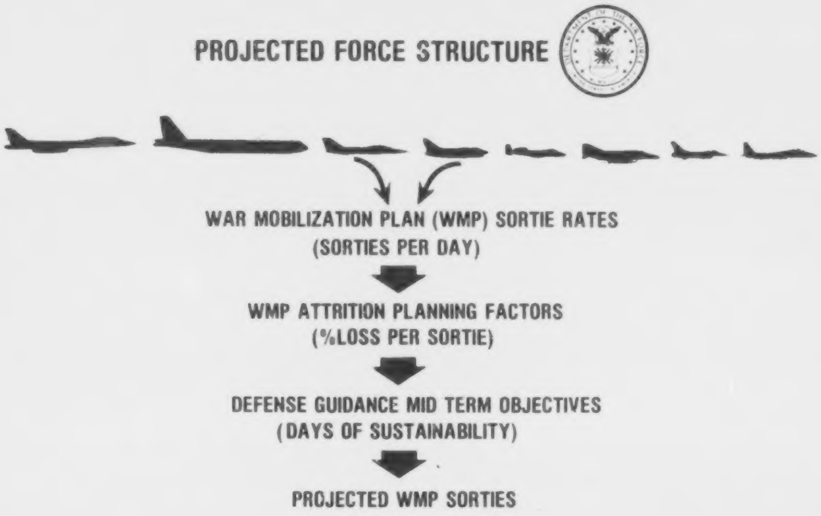
Dr. **Mandelbaum**. Mr. Chairman, when we go into closed session I have some figures from the master plan and can talk about actually some of the percent of targets allocated to the different services.

In addition, on the air-to-air side the effort that Colonel Carter referred to in the JCS, they also have input in terms of an OSD review of the air-to-air threat. We began with the estimates of what the threat was, and allocated those threat aircraft, not only to the services, but also to our NATO allies to get a relative share of how much of that threat each service was considering in its models.

We based our allocation approximately on the relative capability of each of the services and found that the amount of threat that each of the services was assuming was consistent with that.

That effort has been turned over to the JCS and they are there considering that plus other inputs.

Senator HUMPHREY. Continue, Colonel, if you will please.



PROJECTED FORCE STRUCTURE

WAR MOBILIZATION PLAN (WMP) SORTIE RATES
(SORTIES PER DAY)

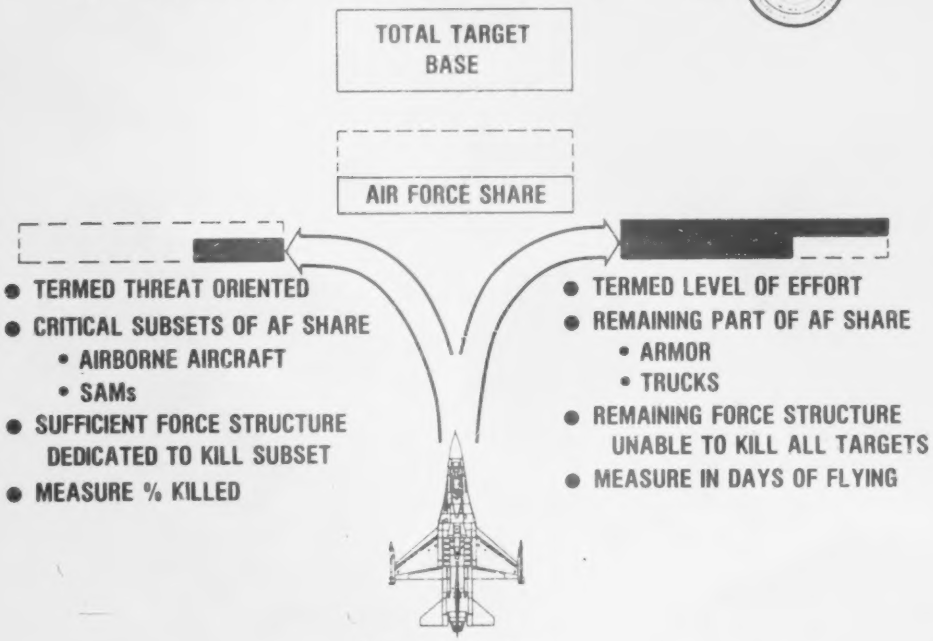
WMP ATTRITION PLANNING FACTORS
(%LOSS PER SORTIE)

DEFENSE GUIDANCE MID TERM OBJECTIVES
(DAYS OF SUSTAINABILITY)

PROJECTED WMP SORTIES

Colonel CARTER. We use the projected force structure at the end of the 5-year defense plan. That force structure multipled by appropriate sortie rates reduced by appropriate attrition rates and considered over the Defense guidance objective period, ends up with the total number of combat sorties to be loaded with munitions. That is what drives the munitions requirements.

COMPUTATION OF WAR RESERVE REQUIREMENTS



TOTAL TARGET BASE

AIR FORCE SHARE

- TERMED THREAT ORIENTED
- CRITICAL SUBSETS OF AF SHARE
  - AIRBORNE AIRCRAFT
  - SAMs
- SUFFICIENT FORCE STRUCTURE DEDICATED TO KILL SUBSET
- MEASURE % KILLED

- TERMED LEVEL OF EFFORT
- REMAINING PART OF AF SHARE
  - ARMOR
  - TRUCKS
- REMAINING FORCE STRUCTURE UNABLE TO KILL ALL TARGETS
- MEASURE IN DAYS OF FLYING

Force Structure

To compute the types of munitions that go on the sorties, we use two types of calculations.

The first is the threat oriented calculation where a very critical subset of the target base is identified by combatant commanders like airborne aircraft and SAM's. The numbers of targets and the weapons probability of kill are used to determine how many weapons are required for that mission. The command dedicates sufficient force structure for that role.

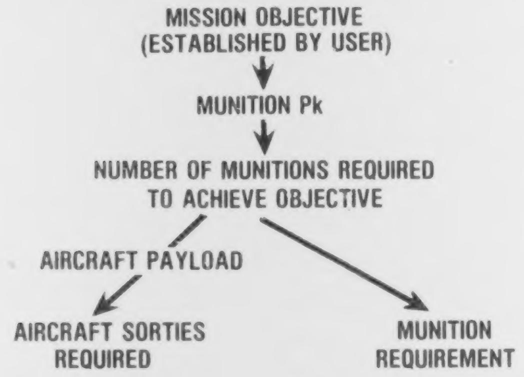
Sustainability of that kind of munition is measured in percent killed of the stated objective. All the remaining targets of the Air Force share and all the remaining sorties are put into the level of effort calculation.

We will not be able to kill all remaining targets with remaining force structure. The objective becomes to kill the most number of the most important targets. Typical of this is armor, trucks, troops in the open, and buildings. Sustainability for these types of munitions is measured in terms of days.

Typical of our threat-oriented calculations is the air-to-air missile requirement. Our basic requirement is comprised of two parts.

First a basic load of air-to-air missiles is provided for all of our air-to-air dedicated aircraft and to that is added the amount of missiles required to kill the Air Force share of the air threat. To that basis requirement we add enough missiles for self-defense of our air-to-ground forces, strategic defense of CONUS and enough additional missiles to offset expected losses due to ground attrition.

AIR-TO-SURFACE
THREAT ORIENTED CALCULATIONS



MISSION OBJECTIVE
(ESTABLISHED BY USER)

MUNITION Pk

NUMBER OF MUNITIONS REQUIRED
TO ACHIEVE OBJECTIVE

AIRCRAFT PAYLOAD

AIRCRAFT SORTIES
REQUIRED

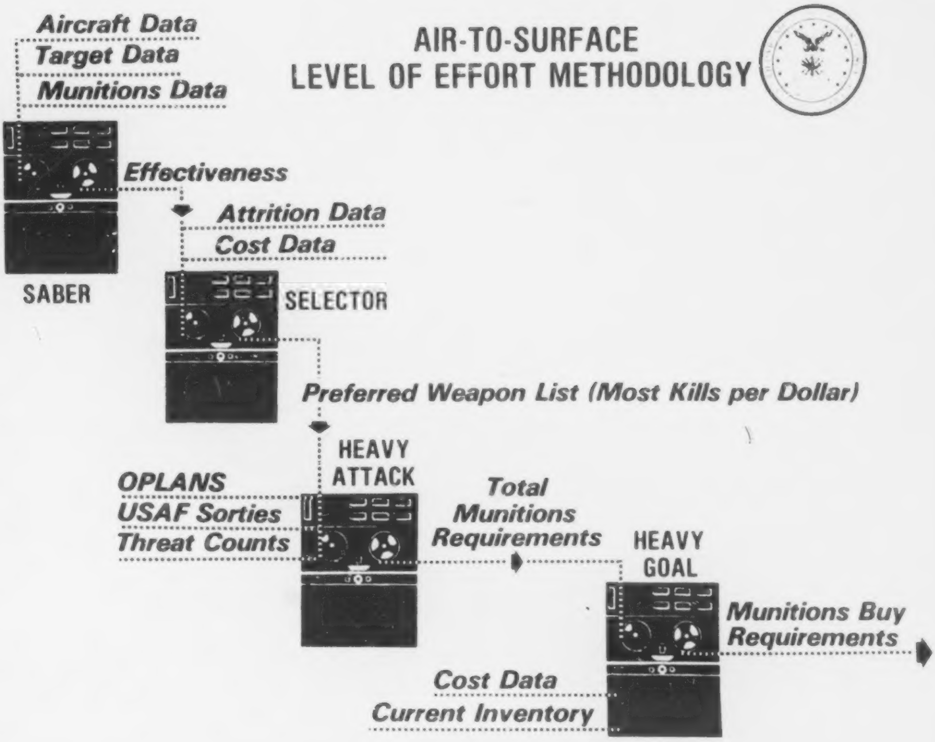
MUNITION
REQUIREMENT

Examples

MISSION AREA	MUNITION
• DEFENSE SUPPRESSION	HARM
• AIRFIELD ATTACK	DURANDAL, GATOR, DAACM, AGM-130B
• MINING	GATOR

Similar to the air-to-air missile requirement is the air-to-ground threat-oriented requirement where the mission objective is described by combatant commanders, the munitions PK determined, how many are required, and the aircraft payload determines how many sorties must be dedicated to this rule.

Typical of this type of calculation is the high-speed, antiradiation missile [HARM]. These additional weapons are all typical of the threat-oriented requirements for air-to-surface.


AIR-TO-SURFACE
LEVEL OF EFFORT METHODOLOGY
Aircraft Data
Target Data
Munitions Data
SABER
Effectiveness
Attrition Data
Cost Data
SELECTOR
Preferred Weapon List (Most Kills per Dollar)
HEAVY ATTACK
OPLANS
USAF Sorties
Threat Counts
Total Munitions Requirements
HEAVY GOAL
Munitions Buy Requirements
Cost Data
Current Inventory

The remaining sorties and remaining target base we use a computerized level of effort methodology. First the weaponeering model computes the probability of kill for each of three and a half million cases considered in our process. These are combinations of aircraft, targets, weapons, weather, and scenario.

The next model selects the best weapon for each of those combinations.

The third model allocates the force structure to the target base.

The final model then adds in the miscellaneous items to the munitions, such as fuzes and fins, to come up with a total requirement.

PREFERRED WEAPON SELECTION

(Most Kills per Dollar Criteria)

DEPARTMENT OF THE AIR FORCE

$$\textit{Cost per Sortie} = \underset{\left(\substack{\text{WEAPON}\\\text{COST}}\right) \times \left(\substack{\text{WEAPON}\\\text{PAYLOAD}}\right)}{\text{WEAPONS COST}} + \underset{\left(\substack{\text{AIRCRAFT}\\\text{COST}}\right) \times \left(\substack{\text{EXPECTED}\\\text{ATTRITION}}\right)}{\text{ATTRITION COSTS}} + \text{O\&M COSTS}$$

$$\textit{Sorties per Kill} = \frac{1}{P_K \text{ (PER SORTIE)}}$$

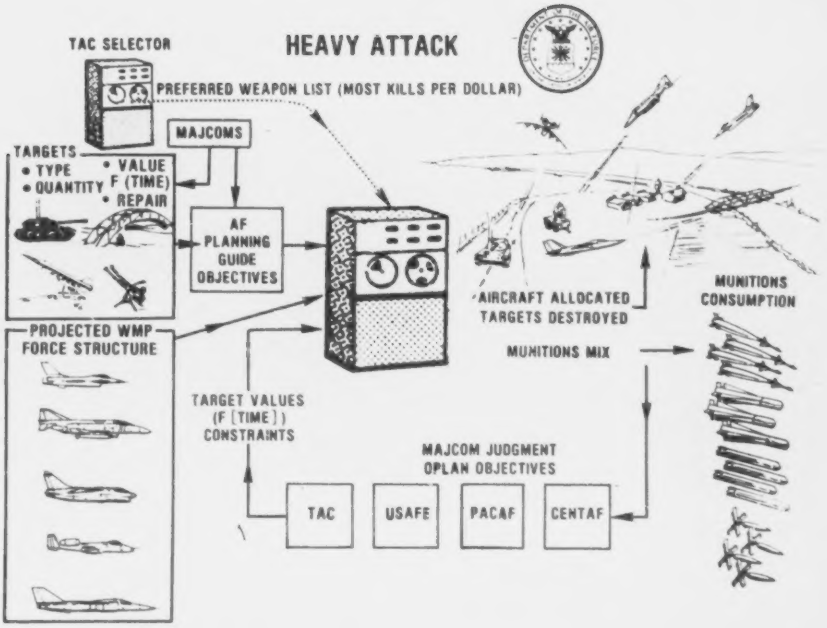
$$\textit{Cost to Kill} = \text{(COST PER SORTIE)} \times \text{(SORTIES PER KILL)} \times \left[1 + (K_s + K_i)\right]$$

RANKING OF PREFERED WEAPONS FOR EACH
AIRCRAFT/TARGET/WEATHER COMBINATION

WEAPON X	LOWEST COST/KILL	MOST PREFERRED
WEAPON Y	↓	↓
WEAPON Z		
WEAPON W	HIGHEST COST/KILL	LEAST PREFERRED

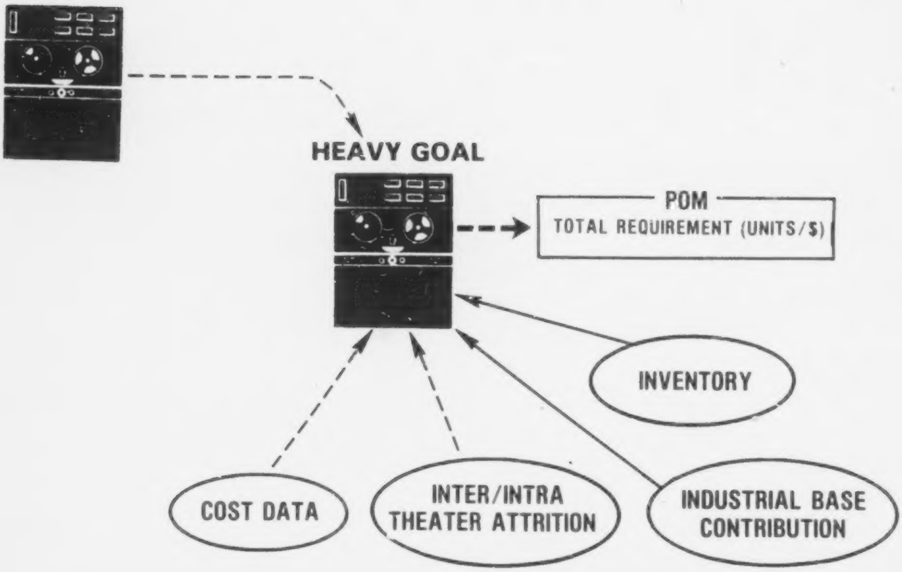
There are two important considerations when our computer determines the preferred munition. These are the probability of killing the target and the probability of surviving the sortie. To do that, we measure the cost to kill which is the cost per sortie times sorties to kill. The cost per sortie is the sum of weapons cost, attrition cost and O&M cost.

We then rank order all the possible weapons that could be used to attack and kill the target. The least cost-to-kill, becomes the most preferred, while the most cost to kill is the least preferred.


HEAVY ATTACK
TAC SELECTOR
PREFERRED WEAPON LIST (MOST KILLS PER DOLLAR)
MAJCOMS
TARGETS
• TYPE
• QUANTITY
• VALUE
F (TIME)
• REPAIR
AF PLANNING GUIDE OBJECTIVES
PROJECTED WMP FORCE STRUCTURE
TARGET VALUES (F [TIME])
CONSTRAINTS
AIRCRAFT ALLOCATED
TARGETS DESTROYED
MUNITIONS MIX
MUNITIONS CONSUMPTION
MAJCOM JUDGMENT
OPLAN OBJECTIVES
TAC
USAFE
PACAF
CENTAF

We load the remaining sorties into the allocation model along with the remaining targets. We run our model and a certain mix of weapons is used and a certain mix of targets destroyed. Then we bring in the combatant commands' representatives and use their judgment to evaluate the solution. We iterate this process until the combatant command representatives are satisfied with the mix of weapons, the allocations of aircraft to targets and targets killed. That then becomes our air-to-ground requirement.

HEAVY GOAL


HEAVY GOAL
POM
TOTAL REQUIREMENT (UNITS/$)
INVENTORY
COST DATA
INTER/INTRA THEATER ATTRITION
INDUSTRIAL BASE CONTRIBUTION

We have now discussed how we generate all the requirements, air-to-air and air-to-ground with the threat oriented and level of effort requirements methodologies. These requirements are loaded into a model called Heavy Goal where we make an additional allowance for inter/intratheater attrition.

We then subtract the inventory from the requirement. We also subtract out the contribution that the industrial base can make in the objective period. We cost out the remaining munitions requirements and that becomes the munitions input to the Air Force Program Objective Memorandum [POM].

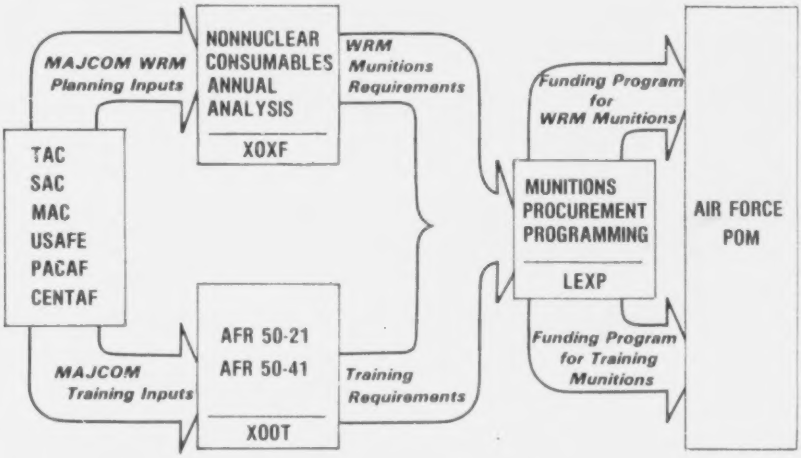
Senator HUMPHREY. How do you calculate the industrial base contribution?

Colonel CARTER. By estimate, sir, from what the Logistics Command has provided to us. Those are generally very small. The industrial base contributions are generally limited to areas like 20 and 30 millimeter. More complicated munition items require much longer production lead time.

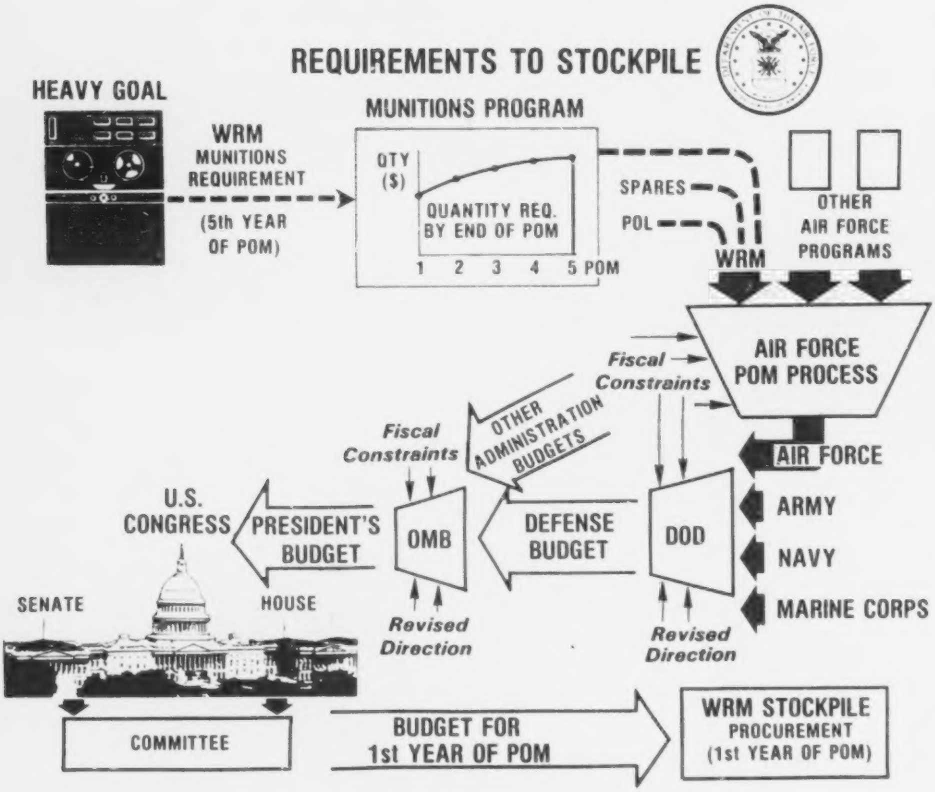
TRAINING MUNITIONS

Moving to training munitions. Training munitions support our training of air crews, both formal training and informal continuation training. The formal training would be conducted at formal schools while continuation training occurs on day-to-day operational sorties.

Training munitions also support evaluations and weapons meets. Training munitions also support individual training for air base defense personnel and personnel involved in ordnance disposal programs.


MAJCOM WRM Planning Inputs
NONNUCLEAR CONSUMABLES ANNUAL ANALYSIS
XOXF
WRM Munitions Requirements
TAC
SAC
MAC
USAFE
PACAF
CENTAF
AFR 50-21
AFR 50-41
XOOT
MAJCOM Training Inputs
Training Requirements
MUNITIONS PROCUREMENT PROGRAMMING
LEXP
Funding Program for WRM Munitions
Funding Program for Training Munitions
AIR FORCE POM

The training requirements are computed in each theater by the individuals wings. Once these requirements are aggregated and come forward to the staff they are combined with the War Reserve Material [WRM] requirements for programming unit costs. Each program is then considered individually on its own merits in the program review process.



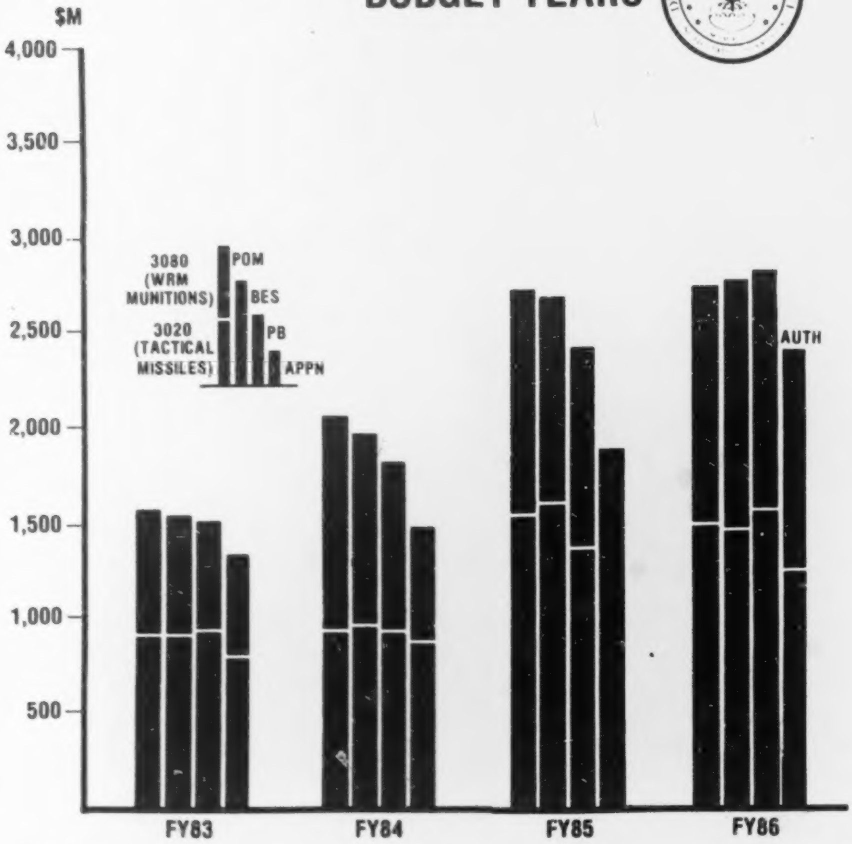
REQUIREMENTS TO STOCKPILE

HEAVY GOAL
WRM
MUNITIONS
REQUIREMENT
(5th YEAR
OF POM)
MUNITIONS PROGRAM
QTY
($)
QUANTITY REQ.
BY END OF POM
1 2 3 4 5 POM
SPARES
POL
WRM
OTHER
AIR FORCE
PROGRAMS
Fiscal
Constraints
AIR FORCE
POM PROCESS
OTHER
ADMINISTRATION
BUDGETS
Fiscal
Constraints
AIR FORCE
ARMY
NAVY
MARINE CORPS
U.S.
CONGRESS
PRESIDENT'S
BUDGET
OMB
DEFENSE
BUDGET
DOD
SENATE
HOUSE
Revised
Direction
Revised
Direction
COMMITTEE
BUDGET FOR
1st YEAR OF POM
WRM STOCKPILE
PROCUREMENT
(1st YEAR OF POM)

Once the requirements are known, they are programmed over a 5-year planning period. They compete with all the other Air Force programs in the Air Force POM. This process balances all the Air Force programs within fiscal constraints and is the first time fiscal constraints are formally applied to the munitions requirements. After that process generates the Air Force POM, DOD evaluates all the services POM's and provides revised direction.

The result of that is a revised, fiscally constrained defense budget which goes to OMB for review. From that comes the President's budget for the years 1987 to 1991 which then will come to you in January. After due consideration you pass a budget for the first year of the 5-year program. Before you consider the budget for the second year of that 5-year program, we reaccomplish the whole munitions requirement process.

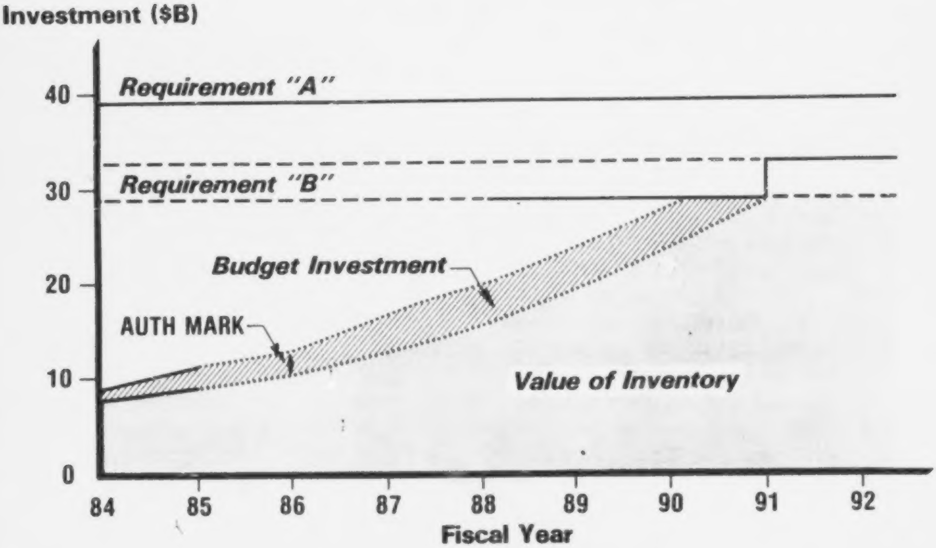
BUDGET YEARS



This slide shows the relevant planning programming and budgeting steps over the past few years for munitions. It shows the adjustments to our munition programs as they go through the review process, Air Force POM is on the left, followed by the best budget estimate submission [BES], the President's Budget [PB] and the appropriations on the right.

You can see over the past few years we have had a healthy growth in munitions programs.

MUNITIONS INVESTMENT



Now, we look at the appropriation compared to the requirement. Requirement A is a long-term goal established by DOD's Defense Guidance.

Requirement B is midterm objectives.

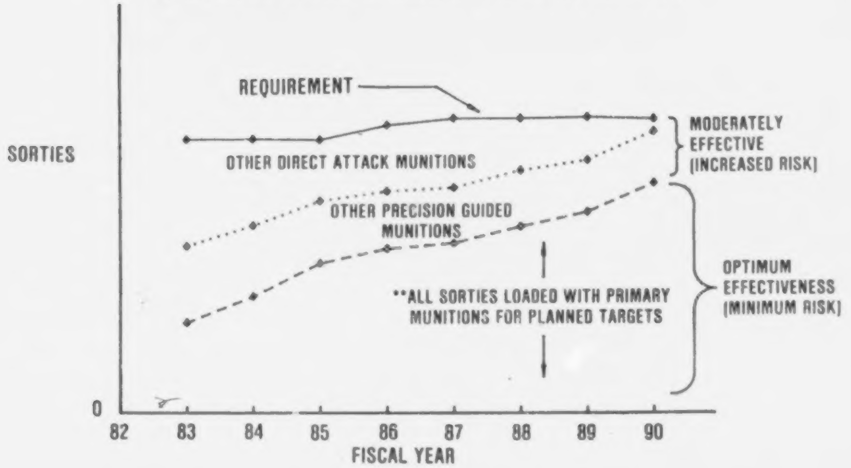
The dollar amounts to satisfy these requirements are $40 billion for requirement A and around $30 billion for requirement B. The authorization mark is indicated by the arrow.

The authorization mark is a major step toward increasing our current inventory toward reaching the midterm objective. It is not until you sum each year's munition investment over the 5-year plan that we will be able to reach our midterm objective.

Senator HUMPHREY. How do you define requirement A and B?

Colonel CARTER. We will cover that in the classified portion.

TACTICAL MUNITIONS SUSTAINABILITY (GLOBAL WAR ORIGINATING IN NATO)



What these yearly investments do for our munitions sustainability, sir, is shown by the line at the bottom of the chart. That line shows the percentage of sorties that we can fill with preferred weapons as defined by the process just described.

The top line is a mid-term objective requirement. Between those two lines another line shows the additional number of sorties that can be loaded with older precision guided munitions.

We can support the total combat sortie requirement, but not all with the proper munitions, some must be loaded with other older less preferred munitions.

That, sir, concludes the open portion of the Air Force presentation.

Senator Humphrey. Thank you very much.

Dr. Mandelbaum?

STATEMENT OF DR. JAY MANDELBAUM, ASSISTANT DIRECTOR FOR LOGISTICS, READINESS AND SUSTAINABILITY ANALYSIS

Dr. Mandelbaum. Thank you, Mr. Chairman.

I am pleased to be here to provide this information to you today. Before me, each of the services has talked about the process by which the budget is prepared and is submitted to Congress. With your permission, I will skip that part of my statement and, hopefully, clarify some points of definitional.

Let me begin by talking about the objectives that you heard people refer to today.

The defense guidance establishes what we call long-term goals. These goals are not fully funded by the services. Rather the services attempt to fund fully the mid-term objectives stated in the defense guidance.

When we get into the classified session, I will tell you specifically what those midterm objectives are. For the remainder of this statement, I would like to talk about another aspect of the requirement and that is something that we call the mobilization requirement or what comes after the 180 days the Army referred to in its testimony.

The long-term goal for munition sustainability defined in defense guidance is D to P. For each munition we want a sufficient quantity stockpiled to last until the production base in geared up to meet the wartime consumption.

Senator **Humphrey**. Do you still have that as a goal?

Dr. **Mandelbaum**. That is the long-term goal.

Senator **Humphrey**. That is what you are talking about?

Dr. **Mandelbaum**. Yes.

Now, this mobilization requirement has a different interpretation, however, when you distinguish between threat-oriented munitions and level of effort-oriented munitions with respect to the requirements process.

On the threat-oriented side first, stockpile requirements are calculated as the number of munitions needed to destroy all enemy targets of a certain type. In theory, once these targets are destroyed, there is no need for additional munitions unless the enemy generated additional targets to be killed.

So, in theory, once we purchase our requirement for threat-oriented munitions, we are at D to P. What the production base has to do is to be able to gear up to produce enough munitions to be able to take care of new targets as they are generated.

The Air Force air-to-air missiles are a good example of that. Mobilization requirements for heat-seeking and radar missiles equal our estimates of the enemy's capability to generate new aircraft.

Now, the time to produce new missiles, however, is slightly less than the time to produce new aircraft in terms of heat-seeking and radar missiles. Therefore, what we need from the production base is the ability to surge and to develop productivity improvement so that that rate can stay ahead of the enemy's ability to deliver new aircraft.

In the level of effort case the situation is different. The mobilization requirement is the estimated monthly consumption for month seven and beyond, beyond 180 days. It is projected as a constant number for each month.

This projection is based upon our estimates of the consumption in the earlier months of the conflict. So, having determined what the consumption would be in the first 180 days, we use what we think will be beyond that.

The defense guidance midterm procurement objectives part are less than this long-term goal. Therefore, our stockpiles for most level-of-effort munitions are short of that long-term goal.

In addition, the capacity of the production base to mobilize is also less than what we estimate the mobilization requirement to be. Usually the production base is sized to produce the peacetime program, 5-year program quantities on a 1-8-5 production rate. Building a production base——

Senator **Humphrey**. Excuse me, Doctor. Let me discuss that last section.

What is the point of the defense guidance mid-term procurement objectives in that they are acknowledged to be less than the days of supply needed to achieve the D to P goal?

What is the term of the mid-term procurement objectives?

Dr. **Mandelbaum**. They are meant to be affordable within a 5-year program or close to being affordable in a 5-year program.

Senator **Humphrey**. You are saying midterm procurement objectives are whatever we can afford? Is that how we define it?

Dr. **Mandelbaum**. Risk is taken into account, too. We believe that the midterm procurement objectives that we have for munitions represent a reasonable risk that we will be willing to take, given the funding that we have in the Defense Department.

Senator **Humphrey**. What are the risks that you take into account?

Dr. **Mandelbaum**. At this point we would be talking about relative sustainability of our forces versus the other forces.

I think we should handle this in the classified section.

Senator **Humphrey**. The question is: Are we not deluding ourselves? What is the significance of the midterm procurement objective? Doesn't that simply take the focus off the fact that we are not confining ourselves to the D to P goal?

What is the relevance of this midterm objective? It is self-delusion, is it not?

Dr. **Mandelbaum**. The midterm objectives should not be received by themselves. We should develop, in consonance with them, some areas where we can surge selectively so that we will be able to last longer than those tunes imply.

However, I have also said the base cannot reach that level that we say we want to achieve. What we are trying to do in acquisition and logistics in OSD, is develop another strategy for looking at this problem given the kind of funding constraints that we have, and given where we are and where we would like to be.

We will have to make some compromises in the new strategy.

For example, maybe it is not best to try to surge everything.

Maybe we just want to surge some important things that we think we will need to be able to keep fighting and maybe we will be able to do that and therefore reduce the shortfalls.

Senator **Humphrey**. What do you mean by surge?

Dr. **Mandelbaum**. To increase the capability of the production base to produce and to decrease the time at which it can begin contributing to the war effort.

Senator **Humphrey**. How do you do that?

Dr. **Mandelbaum**. There are some surge programs underway now that are being funded.

Senator **Humphrey**. You are welcome to call on your colleagues.

General **Molinelli**. Maybe I can help a little bit here. There are several ways to surge. We talk about the production base. If we have an ongoing level of effort line or ongoing economic production line, we are capable of raising the output of that line by 125 percent, generally speaking, in the first 90 days——

Senator **Humphrey**. How do you do that? Shut down other lines and convert?

General **Molinelli**. I am sorry?

Senator **Humphrey**. You convert other lines?

General **Molinelli**. No. With the existing line, essentially we go from a 1–8–5 shift to a 2–8–5 shift. You can say why did you not go to a 3–8–5 shift?

The reasons we are not able to do that initially is because there are contributing parts to that production process which must be accelerated also. So, generally speaking, we say in the first 90 days we can get 125 percent increase in that line.

At the 125 percent level we will be able to increase that production process to 175 percent the succeeding month.

Senator **Humphrey**. That takes into account the need to train new people to man those shifts?

General **Molinelli**. Yes, sir.

Senator **Humphrey**. Are there subcontractors involved?

General **Molinelli**. Absolutely, subcontractors are involved in most of the cases. Now, this only takes into context an open line. I can tell you that the worst case is where I have a production facility laid away and stored and then it takes me 11 months, generally speaking, to get the production line up to full rate.

At 11 months I am at 100 percent production on that line. I will get some production out of a cold base line, about 5 percent of its capability, in the fifth month.

Those are the two extremes of how we talk about surging a production base.

Then, of course, we do have some commercial contracting available. As you are well aware, we do commercially buy some of our ammunition and they are able to accelerate to varying degrees.

We have 87 commercial contractors on a contract in which they agree to store and maintain certain facilities for mobilization. We do, in fact, check these facilities to make sure that the contractors still have them and that they are usable.

They are not all in operation, so to that buildup you will have to attribute the cold base buildup which says it will take 5 months to get 5 percent of your production line, it would be a year before you would be at the level that you desire.

Those are the three ways we are able to build up our production base and to surge the existing lines.

Dr. **Mandelbaum**. There is another program that Congress has funded in 1985 and a request for additional funding has been submitted in 1986—the stockpiling of long lead time material. The goal there is to be able to significantly increase the production of certain munition items in a short time, 3 to 6 months.

Senator **Humphrey**. What kind of material are you talking about? Raw material?

General **Molinelli**. For the Army's case, a good example, one you are quite familiar with, will be the TOW missile in TOW 2 configuration.

I am sure there are other examples. We intend to be able to surge that base by buying stockpiling parts, military parts for that missile and be able to surge it to 1,500 additional missiles per month.

Then the other services have examples, too, I believe.

Dr. **Mandelbaum**. One of the good things about this program is in theory it has low to zero cost, over the long run. These long lead time materials that we plan to buy will ultimately be used in the production of the TOW 2 missile, assuming we buy the requirement.

Senator **Humphrey**. Thank you for that explanation of the term surge.

I am still wrestling with the business of D to P versus midterm procurement objectives. The D to P is clear, the stockpile item you would like to have on hand to provide your supply until production can meet expenditures in combat; is that a correct interpretation?

Dr. **Mandelbaum**. That is the long-term goal, yes. As the Army said earlier in testimony, it may not be wise to invest all that money in a given round, because a short period late we will find there is a new and better round.

Senator **Humphrey**. No doubt, but that is a minor factor. The real problem is not enough bucks; is that not the case?

Dr. **Mandelbaum**. Yes.

General **Davidson**. Additionally, I would hope that in a number of conflicts we could terminate them before they go to a protracted war.

So, in that sense, the midterm objective is really a judgment call that takes into account affordability and some minimum level of sustainability with which we feel comfortable and with which we can operate and achieve an early victory. It is not designed to support a World War II scenario or something that goes on for years and years.

Senator **Humphrey**. At what place in DOD or services are these midterm procurement objectives stated? Who decides what they are and where?

Dr. **Mandelbaum**. They are stated in the defense guidance.

Senator **Humphrey**. What criteria do you use in constructing these midterm objectives?

Dr. **Mandelbaum**. In part it is affordability. We are not going to set a goal that is completely unrealistic in terms of what we can afford to buy.

Senator **Humphrey**. We all know we cannot afford all we need. That is not the only criterion. There must be some safety factors built into this.

Are there explicit criteria on which these midterm procurement objectives are constructed?

Dr. **Mandelbaum**. Studies have been done in the past and to some extent some of these objectives are based upon what we think the enemy can do.

There are no stated criteria in the defense guidance, if that is what you are asking.

General **Molinelli**. Mr. Chairman, I would like to try to address that question.

In preparation of the defense guidance there are a number of deliberations that are ongoing annually as to some of these goals that are reached. I cannot tell you exactly how we reach those goals except perhaps whoever has the strongest will at the time.

But some of the things that are considered and we recognize are that the requirements determined in the scenario are based upon three wars at one time, three theaters. The probability of that happening is not extremely high, but it is a worst case. We take a bit of risk when we say we are betting it will not occur in three theaters at one time. We accept some risk as we accept risk in building our defense, the size of our forces, the number of wings the Air

Force wants, the amphibious forces the Marines would like to have, and the number of divisions that the Army has. There is some risk in that.

In addition to that, we weigh other factors as to our means to move stored munitions from one side of the world to the other.

Then we also take some risk in the level of munitions that we procure for our war reserve. These factors come together to give, associated with affordability, a planning objective that the services are requested to buy to about midway through the program objective memorandum and by the end of the program objective memorandum.

Senator HUMPHREY. It sounds like a subjective process.

General MOLINELLI. I would not be honest if I did not tell you there were some subjective thoughts and decisions reached.

Senator HUMPHREY. The D to P goal is fairly solid, is it not, in that we have some fairly realistic projections of how long it would take to mobilize, where we can surge and not surge, and so on?

That seems to be pretty solid as an objective. If I understand this midterm objective process, it sounds pretty subjective to me and it sounds like a point in the process which can be used as a fudge factor to square funding with goals.

Am I correct in that?

General MOLINELLI. I think the goals are more realistic than perhaps I led you to believe. The goal is realistic. When you say goal, that is where the guidance comes down that the Defense Department would like the services to buy to.

That is a realistic goal, which is given to us about a year ahead of the time when we do our programming and budgeting and we agree with that. We look at the realities of life, as all the services can tell you. I can tell you in exact terms, the Army in April was told to take out $7 billion and in the summer we were told to take another $2⅓ billion.

When we get down to those kinds of constraints, we do not reach those goals.

Senator HUMPHREY. Then you adjust your midterm objectives?

General MOLINELLI. No. The objectives are not changed. The services are just unable to accomplish the objective.

General DAVIDSON. Another big change which has occurred over the years that complicates this discussion is what is often referred to, the fact that the next conventional war will probably be a come-as-you-are war, meaning simply that the destructive power of modern, even conventional weapons is such that it is not likely there will ever be time to reach full production phase as we were able to do in the great war.

That brings in the affordability issue again. That is a real complicated factor.

Dr. MANDELBAUM. There were some studies that have looked at these things. In 1979 a sustainability study was performed. It looked at, after a certain number of days, how many enemy targets were killed and what the condition was of our fighting forces. Then in a partially subjective way identified a prudent risk number of days, and a high but acceptable risk number of days.

At some point that becomes judgmental, but these things have been examined in the past.

Senator HUMPHREY. Will you continue with your testimony, please.

Dr. MANDELBAUM. We have skipped around a bit.

Senator HUMPHREY. I think you were just starting page 6, based on my copy.

Dr. MANDELBAUM. The next point I was about to make was that the way we size the production base now at the 1-8-5 level to produce what is in our 5-year plan is a good way to do it. It should not be sized higher than that because of scarce fiscal resources.

Given that procurement remains constant, if we build a bigger plant, unit price will go up because the plant will be operating at a less efficient level. Part of that larger base could be laid away, but a laid-away facility, as General Molinelli said, takes longer to mobilize than an active facility. That fact would partially negate the justification for buying that larger base.

In addition, there are maitenance costs associated with a laid-away base.

The basic point is that the defense guidance midterm objectives are less than the number of days we need to fully mobilize the base and we do not have enough money to fund these objectives fully.

Therefore, an investment in additional brick and mortar to build more facilities would be a lower priority in most cases than production surge or productivity investments or stockpiles themselves to get closer to the objective.

Given all this, we are, as I said before, trying to look at another strategy, another way of approaching these issues in OSD.

There is a fourth step to that strategy—we want to bring into the inventory modern force multiplier munitions as quickly as we can. These munitions through greatly increased fire power will, hopefully, be able to more successfully blunt the first attack and, therefore, increase our survivability. By increasing our survivability, we increase our sustainability.

Senator HUMPHREY. Let me ask you this.

If the Department truly believed that this use of more force multiplier munitions reduces the need, reduces the necessary size of the stockpile, then why do we not change our stockpiles?

Dr. MANDELBAUM. What we are saying in that regard is that with the force multiplier munitions, it is possible that the intensity of the war later will be less than what the models plan, but we cannot guarantee that.

So, we do need to keep those stockpiles at the rates that the models are best able to predict, at those rates that we believe will expend the munitions.

Senator HUMPHREY. On the one hand we are gambling that giving emphasis to the force multiplier munitions will reduce the likelihood that we need larger stockpiles of other munitions. That is a gamble we are taking.

Dr. MANDELBAUM. We are not really gambling. We are in fact doing the best we can. We are buying those force multiplier munitions that have been developed.

Senator HUMPHREY. We are cutting down on the buy of conventional munitions because, as you tell us, we are putting more eggs into the force multiplier basket, is that not correct?

Dr. **Mandelbaum**. We are doing both. In many cases some of these force multiplier munitions are not yet in inventory.

Senator **Humphrey**. That is even worse.

Dr. **Mandelbaum**. They are coming from R&D. We are working on the R&D to try to get them out into production.

We are also trying to increase the efficiency of the production for not only these modern munitions, but really all munitions.

Senator **Humphrey**. How are you trying to do that?

Dr. **Mandelbaum**. There are other programs being funded in the areas of manufacturing technology and flexible manufacturing programs which are helping us there.

In the area of manufacturing technology we try to buy technology to be able to produce things faster and cheaper. Flexibile manufacturing is one that tells us to produce materials at the most efficient rate we can in peacetime.

But still part of this strategy is one where we want to increase the stockpiles for the munitions we will transition to after the early days of conflict.

Senator **Humphrey**. When we go into closed session, will we see that statement borne out by the figures? Are we going to see increases over the last couple of years in those munitions we will transition to after the initial stages?

Dr. **Mandelbaum**. If you look back over the past few years, there are large increases in the amount we are spending on munitions in building up our inventory.

Senator **Humphrey**. However, it is expressed, days of supply, I am not talking about dollars spent, will we see that translated into an increase in the stockpile?

Dr. **Mandelbaum**. Yes, you will see that in closed session.

Senator **Humphrey**. I think it is important for the people to know that.

Dr. **Mandelbaum**. Finally, invest in areas which will enhance our ability to surge as we spoke of earlier.

This concludes my opening statement.

[The prepared statement of Dr. Mandelbaum follows:]

Prepared Statement of Dr. Jay Mandelbaum

Good afternoon. My name is Jay Mandelbaum and I am the Assistant Director for Logistics, Readiness and Sustainability Analysis in the Office of the Assistant Secretary of Defense for Acquisition and Logistics.

I am pleased to provide for you today an OSD perspective on the munitions requirements and procurement processes. Much of what I would have said was presented earlier. Therefore, I would like to give a brief outline of the process in OSD that leads to the January budget submittal to Congress.

I will also supplement the discussion of the requirements determination process as a precursor to tomorrow's hearing on the production base.

In the classified portion of my statement, I will explain those portions of the defense guidance that establish the basis for the requirement determination processes we have been discussing.

OSD REVIEW PROCESS

In May, the military departments submit their 5-year programs to OSD in the form of program objective memoranda or POMs. These POMs, along with other more detailed backup material, provide the information for an OSD review of all munitions procurement.

The OSD staff reviews the munitions procurement programs for such things as:

Extent of compliance with the mid-term procurement objectives in the defense guidance;

Executability of the program in terms of large funding changes from year to year;

Extent of funding for selected modern force multiplier munitions;

Changes in requirements determination methodologies and consequent affect on the requirements themselves;

Changes in requirements due to changes in force structure or weapon system modernization;

Efficacy of the peacetime production base;

Surge capability and mobilization of the production base.

In 1983, the Secretary established a "munitions council" composed of principals from OSD, OJCS, and the services. It is chaired by the Under Secretary of Defense for Research and Engineering. This group is chartered to develop and procure a more effective and affordable mix of modern munitions for DOD. The munitions council serves a coordination and advisory role in the program review.

"Issue papers" that identify alternative munitions procurement programs to the POMs are produced as part of the program review. When any of these alternative programs require additional funding beyond that allocated in the POMs, sources of the additional funding must also be identified.

All issue papers are presented to the Defense Resource Board (DRB) in August when programmatic matters are addressed. These decisions become the basis for an October budget submission to OSD by the military departments. In October and November, OSD reviews the budget year funding in great detail. In the fall review, attention is paid to management and financial issues such as acquisition strategies and costs. Final budget decisions are made in December, the result of which is the President's budget submitted to the Congress in January.

MOBILIZATION REQUIREMENT

I would also like to discuss one additional aspect of munitions requirements—that of the "mobilization requirement." The defense guidance defines a goal for munitions sustainability as D to P. That is, for each munition, a sufficient quantity should be stockpiled to last until the production base is geared up to produce enough rounds to meet the combat consumption. The mobilization requirement is the munitions usage at this point.

I will now discuss the mobilization requirement in more detail. First, I will discuss it for threat-oriented munitions. Stockpile requirements for threat-oriented munitions are calculated as the number of munitions needed to destroy, within some confidence level, all enemy targets of a certain type. In theory, once these targets are destroyed, there is no need for additional munitions. Mobilization requirements for threat-oriented munitions thus become the number of munitions needed to destroy new targets as they come off the assembly line. Consequently, when we have purchased our desired stockpile, we would effectively be at D to P. The only potential other investments would be ones to remedy production surge bottlenecks and inefficiencies.

Air-to-air missiles are a good example. Mobilization requirements for heat-seeking and radar missiles would equal our estimate of the enemy's capability to generate new aircraft. Since the time to produce the missiles is less than the time to produce an aircraft, our production base would only need to surge when required to destroy additional targets. Instead of additional capacity, there is need for productivity improvements and surge capability.

In the level-of-effort case, the situation is different. The mobilization requirement is the estimated monthly consumption for month seven and beyond. It is projected as a constant number for each month and is based upon the estimated consumption in the earlier months of the conflict.

The defense guidance mid-term procurement objectives, in terms of days of supply, are less than the days of supply needed to achieve the D to P goal. Therefore, our stockpiles for most level-of-effort munitions are well short of our long-term goal. In addition, the capacity of the production base is well short of the mobilization requirement. Usually, the production base is sized to produce peacetime programmed quantities at a 1-8-5 (one shift—8-hour day—5-day week) production rate.

Building a production base with a larger capacity than needed to buy mid-term objectives in 5 years is not a high priority application for scarce fiscal resources for several reasons.

Assuming procurement remains constant, a larger base would be operating at an uneconomical level and, consequently, unit price would increase.

Part of the larger base could be laid away; however, the justification for buying that additional base would be negated by the lengthy lead-time needed to bring a laid-away base to maximum capacity in addition to maintenance costs of the laid-away facilities.

Defense guidance mid-term procurement objectives are less than the number of days needed to fully mobilize the base. We do not have enough resources to fund these objectives fully. Therefore, an investment in an expended production base capacity (brick and mortar) is generally of lower priority than production surge investments, necessary base modernization for improved productivity, and the munitions stockpiles our forces need to survive until laid-away production base can contribute.

Given these relationships among stockpiles, mid-term procurement objectives, mobilization requirements, and production base capability and capacity, I will conclude by stating the broad strategy we are attempting to pursue in OASD (A&L) in the sustainability area. Given the fact that we are so far short of our long-term goals, we are striving to make an assessment of our capability given where we are and where we can potentially go under realistic fiscal constraints. We will then attempt to execute the program that best increases our capability. The following areas are high priority ingredients of this strategy:

Develop and procure the modern force multiplier munitions that will enable us to increase our effectiveness in the early days of a conflict through enhanced lethality, greater engagement rates, and standoff capability. These modern munitions will increase our survivability and, therefore, our sustainability.

Obtain efficient production for these modern munitions.

Increase stockpiles for those munitions we will transition to after the initial stages of the conflict. In theory, an effective use of modern munitions early in the conflict may reduce the intensity of later combat and, therefore, allow our planned stockpiles to last longer.

Invest in areas which will enhance the ability of the production base to surge more quickly to improve sustainability for critical rounds. The faster the production base can respond, the smaller our stockpiles need to be.

We realize it will be difficult to carry out this strategy fully. However, we are taking new, promising initiatives to improve our ability to surge. We will continue to apply resources in these areas in as balanced a fashion as possible.

Senator **Humphrey**. One question. You say "the following areas are high priority ingredients of the strategy" and the last "invest in areas which will enhance the ability of the production base to surge more quickly and improve sustainability."

How are we investing in such areas?

In fact, there is no money in 1986 or anticipated for 1987 to improve the production base.

Dr. **Mandelbaum**. There is surge money in the 1986 President's budget. I believe the Army has money.

General **Molinelli**. Not in 1986.

Dr. **Mandelbaum**. There was TOW 2 money in 1986.

Senator **Humphrey**. By this paragraph, you do not mean a general improvement in production base, you are just talking about facilitating surge or enhancing surge capability?

Dr. **Mandelbaum**. Capability for specific items.

Senator **Humphrey**. Before we go to closed testimony, let me just review some notes that I have.

We have $2.6 billion in 1986 for munitions procurement.

General **Molinelli**. If that is a question to the Army, I believe that is correct. I can check that number.

Senator **Humphrey**. Those munitions are under your jurisdiction?

General **Molinelli**. I am sorry, sir. I did not hear the question.

Senator **Humphrey**. $2.6 billion for the Army-managed munitions?

General **Molinelli**. 2.635, yes, sir.

Senator **Humphrey**. You are proposing 2.1 in 1987.

Is that still the proposal?

General MOLINELLI. Our fiscal year 1987 figures are a planning figure at this time until we get the budget submitted to Congress, but that is a close approximation. Those figures also include some money for the production base.

Senator HUMPHREY. How much?

General MOLINELLI. In fiscal year 1986, $368.4 million and in fiscal year 1987 it is $310 million.

Senator HUMPHREY. Is that surge capability or is that real improvement?

General MOLINELLI. That is for changing some lines and some improvements and some new programs that come on line.

Senator HUMPHREY. What is the effect of that very substantial reduction going to be in our stockpile? How will that be reflected?

General MOLINELLI. I will be prepared to address that—are you talking about 1987?

Senator HUMPHREY. Yes, assuming that planning figure becomes the OSD submission.

General MOLINELLI. I would rather address that in closed session, sir.

Senator HUMPHREY. Where is this $2.1 billion figure coming from? Who proposed that?

General MOLINELLI. The $2.1 billion is a result of the deliberations that go on within the Army as to how much of the total procurement dollar goes to Procurement of Ammunition, Army.

As General Knudson stated, that is the result of the deliberations which were ongoing in and up to this month in terms of the Total Obligational Authority we had to put against Procurement of Ammunition.

Senator HUMPHREY. Is that going to result in a leveling cut in some future year?

What is generally the time lag? When do we actually acquire the munitions purchased with funds from a given fiscal year?

General MOLINELLI. The funded delivery period for each munition generally is 12 months. Specific munitions, it would vary. We generally speak of it as 12 to 14 months.

Senator HUMPHREY. We are told when we go into closed session we are going to see an improvement in the stockpile in the last several years.

What will be the effect on that trend line if this 2.1 figure is the final figure for fiscal year 1987? What will be the effect on that trend line?

General MOLINELLI. On the line you are looking at, the trend over the years?

Senator HUMPHREY. Yes.

General MOLINELLI. Sir, I would rather discuss that in closed session.

Senator HUMPHREY. I am trying to phrase it in such a way that we can talk about it in open session.

General MOLINELLI. The program which is not yet final for 1987 in terms of ammunition, does not put a smile on my face. That is the easiest way to say it.

Senator HUMPHREY. What will it do to the trend line? Will we see a downturn in the trend line?

General Molinelli. I would say that we are about holding our own. I do not think you will see a downward trend in the line of terms of days of supply.

I would say that we are holding our own. There are some other factors to be considered in this that we are not able to discuss.

Senator Humphrey. But not further improvement?

General Molinelli. That is a fair statement.

Senator Humphrey. Against the background of known substantial shortfalls in the stockpiles?

General Molinelli. As I said, it was a planning factor. It is not a final number and I will be very honest with you, Mr. Chairman, it is an issue that is being argued today. I just got an update on it and it may not be the number that you are looking at right now. It may be a substantially higher number.

I should know by this evening or tomorrow where that number might fall. What you have in front of you is a planning number that has not been finalized.

Senator Humphrey. I am glad to hear that matter is still under debate.

I want to address finally before we go to closed session the situation in the production base.

The Army submitted some time ago a program of $500 million in the 5-year defense plan to improve the situation in the production base which in itself is pretty darn inadequate. We have about a $62 billion shortfall in the production base. The Army committed some $500 million to that.

Did you tell me a moment ago that there is money as part of this commitment in 1986?

General Molinelli. I did tell you that there is a commitment to spend those funds, however, due to other higher Army priorities, the $500 million did not get funded.

Senator Humphrey. How much is it in 1986?

General Molinelli. There is $368.4 million funded in fiscal year 1986 in support of peacetime requirements.

Senator Humphrey. To be expended in fiscal year 1986?

General Molinelli. Yes, sir. The Army has made a commitment to try to fund $500 million in improvements, for mobilization annually and has been unable to meet this level due to other higher priorities.

I am reminded the $368.4 million you see here is peacetime improvement for ongoing lines and new lines and the $500 million is for mobilization and surge requirements to meet our wartime needs.

Senator Humphrey. Those are two separate things?

General Molinelli. Yes. sir.

Senator Humphrey. They are zeroed in in 1986.

General Molinelli. For $500 million, yes.

Senator Humphrey. And zero planned for 1987?

General Molinelli. I would rather discuss 1987 in closed session, if I might.

Senator Humphrey. Let us discuss the distinction. You have one category that addresses surge capability; is that correct?

General Molinelli. One category is $368.4 million that invests in adding new lines to the ongoing production in support of peacetime needs. The other category, $500 million support mobilization requirements. The $500 million is a part of the identified shortfall of $65 billion.

Senator HUMPHREY. Shortfall in what, brick and mortar? What is that? Where is the distinction?

I do not understand it.

General MOLINELLI. The distinction in the $300 million annual number lies in establishing a new line to produce a new round of ammunition. There is a whole liturgy of improvements, such as brick and mortar, compliance with safety standards, etc.

The $500 million is also an investment in brick and mortar and in lines to provide the alternate ability to produce the same round in two or three different plants, although we would only operate one in a peacetime mode. The $500 million supports mobilization requirements.

It is pointed out the $500 million, the one we are talking about here, is to reach 40 percent of our mobilization requirement. It would be about $65 billion by some people's numbers to meet 100 percent of our mobilization requirement through the year 2000.

Senator HUMPHREY. Sixty-five to meet 100 percent?

General MOLINELLI. Yes, sir.

Senator HUMPHREY. What was this 40 percent figure?

General MOLINELLI. The 40-percent figure is part of a 15-year enhancement plan to reach 40 percent of our mobilization requirement.

Senator HUMPHREY. What does that buy? What would that buy? I still do not see the distinction between those moneys.

General MOLINELLI. Generally that would buy redundancy in the lines of ammunition that you provide. In buying that redundancy, you are buying additional facilities in terms of plants, lines of production, assembly lines and explosives that we use in the ammunition, depending on which type it is.

Redundancy is what it buys. The other $368.4 million buys improvements in ongoing lines, establishes new lines, and there is a limited amount of new procurement.

For instance, RDX/HMX would be that kind of investment.

Senator HUMPHREY. I just want to announce at this hearing, as I did at the last, that the subcommittee has made a request of GAO to study the present structure of our munitions production base to see what can be done about consolidation and finding other efficiencies.

It is my impression initially that our munition facilities are not efficiently structured, that perhaps their configuration over the years has been determined by politics, perhaps more determined by politics than efficiency.

If that is the case, I think we will want to try to make some changes.

In any event, thank you and we will now go into closed session and ask those without security clearances to leave the room.

[Subsequent to the hearing, the following questions were submitted to the witnesses to be answered for the open session of the hearing.]

QUESTIONS SUBMITTED BY SENATOR GORDON J. HUMPHREY

Senator **HUMPHREY**. By what mechanism do the services assure that they are not planning to destroy the same target? For example, both the Army and Air Force compute requirements for conventional ammunition to defeat targets. In computing these requirements, how do they assure that they are not "killing" the same tank(s)? Air Force has a partial answer in their briefing to this question.

Dr. **MANDELBAUM**. There are several efforts underway to assure that there is no excess overlap of targets among the services. One program is between the Chiefs of Staff of the Air Force and the Army to develop a joint target set for this purpose. It is currently underway and making good progress.

The Army's war reserve requirements process models tactical air operations directly.

Last year, there was a joint OSD/Services review of the air threat to be used for computing anti-air munitions requirements. We began with the estimates of what the threat was, and made an initial allocation of those threat aircraft, not only to the services, but also to our allies. We based our allocation on the relative capability of each of the services and allies and found that the amount of threat that each of the services was assuming in their models was reasonably consistent with our initial estimates.

Also, DOD provides annually to Congress an anti-armor master plan. The steering group that prepares this plan is addressing the allocation of the armor threat among the services. The steering group is also considering working with the services to build a more robust multi-functional theater-level model so that we can observe with consistent factors and consistent threat the contributions of each service as we go through the scenario.

Finally, I would stress that we should allocate more than 100 percent of the targets among the services, because we cannot predict exactly how the targets will be employed in battle. We do not want to count too heavily on one component of our force to engage a certain amount of targets if there is a significant probability that the enemy will engage under conditions that would preclude it (e.g., weather sufficiently bad to prohibit use of tactical air with precision-guided munitions). Another example is enemy long-range aircraft, which could be used against either naval or ground targets. We want to be prepared for all plausible cases.

Senator **HUMPHREY**. By what mechanism does OSD assure that each of the services are filling their conventional ammunition requirements at about the same rate?

Dr. **MANDELBAUM**. The services' Program Objective Memoranda (POMs) provide a mechanism for OSD to review the rate by which the services are filling their conventional ammunition requirements.

The services provide separate listings with line-item detail on any munitions for which more than $100 million is programmed over the 5-year period. These listings include the mid-term and long-term objectives, programmed procurement by year, and the resulting inventory by funded delivery period.

Senator **HUMPHREY**. By what mechanism does OSD assure that the services are stockpiling similar "days of supply" of ammunition in Europe?

Dr. **MANDELBAUM**. The United States' responses to the NATO Defense Planning Review Questionnaire (DPQ) identify, by Service, NATO munitions requirements, stockpiles, and other allocated assets. Responses are reviewed annually in the May time-frame and are normally printed in July or August. The DPQ responses, therefore, serve as a mechanism for an OSD review of the relative balance of NATO stockpiles.

Senator **HUMPHREY**. In computing requirements, do the services build a factor for ammunition lost in transit, e.g., ships are sunk?

Dr. **MANDELBAUM**. Yes. The services consider both inter and intra-theater losses.

Senator **HUMPHREY**. Can DOD move the required tonnages of ammunition from CONUS locations to Europe or other locations in the required time-frame during a war?

Dr. **MANDELBAUM**. The U.S. and NATO flag fleets contain large numbers of containerships. These ships cannot move most items of unit equipment but can move ammunition. Our studies show, therefore, that there is adequate shipping to move existing and programmed CONUS stockpiles of ammunition in the required time-frame provided we preposition adequate stocks to cover consumption before the first ships can arrive.

DIVAD

Senator Humphrey. Over the past year, the Army terminated its DIVAD Program. It seems this will create voids in our defense capability. What are the Army plans for filling this void in the fiscal year 1987 through 1991 POM?

General Knudson. At the direction of the Secretary of Defense, the Army undertook the task of developing rapid solutions to the urgent requirement for effective divisional air defense that DIVAD could not meet. The emerging helicopter threat with the growing capability to stand off outside current air defense weapons ranges and engage friendly forces was a major reason for DIVAD's failure. With the fielding in the near future of a new class of Soviet standoff helicopter with more range capable and lethal weapons, the urgency of providing quick solutions to the requirement is more significant. The Secretary of the Army directed Forward Area Air Defense Working Group has just completed a detailed analysis of the deficiencies and provided a new air defense program to Mr. Weinberger to meet the requirement. He approved the program in principle on 8 January 1986. This forward area air defense program consists of the following essential elements:

A robust command, control and intelligence system which alerts both combined arms and Air Defense Artillery weapons of impending air attack using a combination of airborne and ground sensors and providing aircraft identification for those weapons. Fielding of this element would begin in FY 1989.

A new non-line-of-sight weapon which provides the capability to effectively defeat the new "over the hill", stand-off helicopter. Fielding would begin in late fiscal year 1989.

A forward line-of-sight weapon for both the light and heavy divisions which provides the capability to defeat both the forward fixed wing and helicopter threats engaging friendly forces with line-of-sight weapons. This component of the program consists of expedited selection of non-developmental item line-of-sight weapons system with fielding planned to begin in fiscal year 1989.

A rear line-of-sight system which enhances STINGER by placing four to eight missiles, with added sensors and fire control and a pedestal mount, on a HMMWV vehicle. Fielding should begin in fiscal year 1989.

A combined arms enhancement program which improves the Bradley Fighting Vehicle's air defense capability, accelerates the air-to-air STINGER on the OH-58 helicopter, devleops air-to-air capability for the AH/64 and UH-60 and investigates smart munitions for anti-helicopter use by our tanks

WAR RESERVE REQUIREMENTS

Senator Humphrey. General Knudson, are the war reserve requirements for the approved forces fiscally constrained?

General Knudson. No. The computation of the war reserve requirements portion of the Army acquisition objective is not constrained by resource availability.

Senator Humphrey. General Davidson, are the war reserve requirements for the approved forces fiscally constrained?

General Davidson. Yes. As discussed in the methodology portion of the briefing, a "least-cost-to-kill" measure of merit is used to select weapons for the war reserve requirements. This represents a fiscally constrained alternative to a "most-kills/lowest-attrition" measure of merit. Additionally, programming resources to satisfy the computed war reserve munitions requirement competes with other Air Force programs to develop a total Air Force budget which is fiscally constrained.

PEACETIME TRAINING REQUIREMENTS

Senator Humphrey. Are the peacetime training requirements fiscally constrained?

Answer. Peacetime training requirements are fiscally constrained due to TOA shortfalls throughout all Army accounts. The following table reflects training requirements versus current funding profiles in support of the fiscal years 1986–90 budget before Congress ($ in millions).

[In millions of dollars]

	Fiscal year 1986	Fiscal year 1987	Fiscal year 1988	Fiscal year 1989	Fiscal year 1990
Requirement	1150.5	1302.5	1434.1	1501.7	1557.2
Funded	719.2	911.7	1050.6	1197.3	1263.5
Shortfall	−431.3	−390.8	−383.5	−304.4	−293.7

Senator **Humphrey**. General Davidson, are the peacetime training requirements fiscally constrained?

General **Davidson**. Yes. The training requirements are computed using our best judgment of what is needed to prepare our forces for their combat tasking. Procurement of training assets to meet requirements competes for resourses with other programs in the development of a total, fiscally constrained, Air Force budget.

Senator **Humphrey**. How much of the requirement for conventional ammunition is planned to be filled in the fiscal year 1987 through 1991 program period?

General **Davidson**. With the exception of some new munitions which do not enter production until late in the FYDP, approximately 100 percent of our mid-term objective and 75 percent of our long-term goals are programmed in the fiscal year 1986-90 FYDP.

Senator **Humphrey**. General Winglass, are the war reserves requirements for the approved forces fiscally constrained?

General **Winglass**. No.

Senator **Humphrey**. Are the peacetime training requirements fiscally constrained?

General **Winglass**. No.

Senator **Humphrey**. How much of the requirements for conventional ammunition is planned to be filled in the fiscal year 1987 through 1991 program period?

General **Winglass**. The unconstrained requirements for conventional ammunition to be filled in the fiscal years 1987 through 1991 program period by percentages are as shown:

Five-year defense plan:	*Percent*
1987	51.46
1988	61.06
1989	66.79
1990	72.03
1991	78.76

QUESTIONS SUBMITTED BY SENATOR ALAN J. DIXON

CURRENT MUNITIONS STOCKPILES

Senator **Dixon**. Dr. Mandelbaum and service witnesses, are there any of our modern munitions where we actually have a sufficient stockpile to last until the production base is geared up to produce enough rounds to meet combat consumption?

Dr. **Mandelbaum**. The services will answer this question in particular. In general, if procured, our Defense Guidance mid-term objectives for threat-oriented munitions are effectively at the D to P level. In the case of LOE munitions, our procurement objectives are well short of our long-term goal.

Army

General **Molinelli**. The Army currently identifies the term modern munitions with items such as: (a) 120mm Tank Ammunition, (b) AT-4, (c) 155mm Basebleed, (d) 120mm Mortar Ammunition (e) Copperhead, (f) TEX, (g) 81mm HE (UK) Mortar Ammunition, (h) VOLCANO, (i) MOPMS, and (j) MICLIC. Based on this definition, the answer to your question is no. However, if you were to broaden the definition of modern munitions, to those ammunition items that have been purchased subsequent to the cessation of hostilities in Vietnam, the answer to your question would be yes. Examples of these type of munitions would be: (a) Small Arms Ammunition (b) 25mm Bushmaster Ammunition (c) 105mm Tank Ammunition and (d) 155mm HE RAP.

Marine Corps

General **Winglass**. In that the ammunition production base (to include that portion of the base required for Marine Corps surge and mobilization) is managed by the Single Manager for Conventional Munitions, the Marine Corps defers the question to the U.S. Army.

Air Force

Colonel **Carter**. No. There are no modern munitions, either in procurement or in the inventory, whose stockpile will sustain operations until new (after D-Day) production can reach our combat forces.

CAPACITY OF THE AMMUNITION PRODUCTION BASE

Senator **Dixon**. Dr. Mandelbaum, you say in your prepared statement that "The capacity of the production base is well short of the mobilization requirement."

Where are the major production capacity shortfalls—tank munitions, artillery munitions, threat-oriented munitions, or what?

Dr. **Mandelbaum**. Production capacity shortfalls apply primarily to level of effort munitions. These shortfalls occur across-the-board. Production capacity for many tank munitions, artillery and mortar rounds, and bombs is short of the mobilization requirements.

Shortfalls may be judged both on magnitude and on the priority of the munition. Using these criteria, I would judge the artillery area to be one of the weakest.

CAPACITY OF THE AMMUNITION PRODUCTION BASE

Senator **Dixon**. Dr. Mandelbaum, your statement refers to some "new, promising initiatives to improve our ability to surge" production of munitions.

What initiatives are you referring to? Are these initiatives contained in the fiscal year 1986 budget, or are these new programs you are developing for the fiscal year 1987 budget?

Dr. **Mandelbaum**. These initiatives begin with a well-thought-out strategy for determining (1) what our sustainability posture should be in terms of a mix of stockpiles, modernization, surge capability, and facilities; (2) the relative risk (with respect to achieving our national defense objectives) of alternative postures; and (3) our ability, fiscally, to achieve these alternatives. A study is now underway to examine these issues and I expect changes to be incorporated into the fiscal year 1988 budget as a result of this effort.

SUSTAINABILITY OBJECTIVES

Senator **Dixon**. Dr. Mandelbaum, what would it cost in today's dollars to procure sufficient munitions to support U.S. forces from D-Day until production matches combat consumption demand?

Given the exorbitant cost, is this a realistic goal?

Dr. **Mandelbaum**. I do not have a specific estimate; however, it is safe to say that the cost would exceed $130 billion. Realistically we do not plan to spend that much money in the munitions area. That is why, in my testimony, I spoke of developing new initiatives and a new strategy for sustainability planning.

Senator **Dixon**. Dr. Mandelbaum, under the Five-Year Defense Plan, you are reviewing now for fiscal year 1987-91, will any of the Services meet the mid-term sustainability goal in days of supply for modern munitions in the Defense Guidance by fiscal year 1991?

Dr. **Mandelbaum**. There are numerous items for which the objectives are met, and many more for which they are not. Our requirements contain a mix of older, current, and new or modern munitions. Many of the latter could not be produced in sufficient quantity to meet the very demanding fiscal year 1988 or even the fiscal year 1991 objectives. However, even against what could be produced with existing facilities, we are considerably short of sufficient funding.

Senator **Dixon**. Dr. Mandelbaum, does the fiscal guidance you are working under to prepare the fiscal year 1987-91 Five-Year Defense Plan take into account the level of real growth in defense spending likely under the new compromise of the so-called Gramm-Rudman deficit reduction legislation—i.e., no real growth in defense spending at best over the next several years?

Dr. **Mandelbaum**. The fiscal year 1987-91 Five-Year Defense Plan and its associated fiscal guidance were prepared last year, before Gramm-Rudman deficit reduction legislation was passed.

CURRENT MUNITIONS STOCKPILES

Senator **Dixon**. General Knudson, the first chart in your prepared statement shows in priority to fill the various elements that make up the total Army Acquisition Objective for a particular munition.

The eighth priority on this chart is purchase of war reserve munitions for our allies.

Are there any categories of Army munitions where we have reached the level of fill on your chart where we are purchasing munitions for our allies' stocks, particularly our NATO allies?

General **Knudson**. We do not purchase munitions for our allies' stocks. We do have a War Reserve Stocks, Allies (WRSA) program under which we seek to ensure U.S. preparedness to assist selected allies in case of war.

At present, the Republic of Korea is the only ally supported under the WRSA program.

Though earmarked for use by an ally, the United States owns and controls the assets in the WRSA elements of the Army Acquisition Objective.

[Whereupon, at 4:15 p.m., the subcommittee proceeded in executive session.]

EXECUTIVE SESSION

Senator **Humphrey**. General Knudson, do you have some supplementary testimony?

General **Knudson**. No sir, not in closed session.

Dr. **Mandelbaum**. Mr. Chairman, I will start by stating what the defense guidance objectives are and then I will turn it over to General Molinelli and General Winglass.

I will submit my statement for the record. Let me just state that the midterm objectives are based on the fiscal year 1984 to fiscal year 1991 defense guidance. The midterm objectives are for level of effort to buy [deleted] of supply by the end of fiscal year 1988 funded delivery period.

For threat-oriented munitions, to buy enough stock to kill [deleted] of the threat allocated to that service by the end of the Fiscal year 1988 funded period.

The out year objectives, the fiscal year 1991 objectives are to buy [deleted] for level of effort munitions and sufficient stocks to kill [deleted] of the allocated threat by the end of the 1991 period.

Senator **Humphrey**. Have we changed these objectives year by year?

We are always talking about how great it is going to be 5 years from now.

Have these objectives held fairly steadily or what has been the situation?

Dr. **Mandelbaum**. They have been the objective for the last 3 years.

Senator **Humphrey**. [Deleted] of supply [deleted] kill?

Dr. **Mandelbaum**. Right.

[The prepared statement of Dr. Jay Mandelbaum follows:]

Prepared Statement of Dr. Jay Mandelbaum

Munitions requirements are calculated on the basis of an illustrative planning scenario published in the defense guidance. The scenario is consistent with national security objectives, policy, and strategy. It realistically portrays enemy capabilities and reflects U.S. ability to warn of enemy attacks and plausible U.S. and NATO reactions to ambiguous warning.

The scenario is not a prediction of future events or a guide for the employment of forces. It is an illustrative sequence of events upon which to base planning and programming for forces capable of responding to a variety of contingencies that might be expected through 1995 and by which to assess risks in current and programmed forces. Further, it provides a common set of assumptions for use by the services in computing the resources required to meet mid-term objectives.

Chronologically, the illustrative planning scenario begins with hostilities breaking out in [deleted].

Although the illustrative planning scenario provides a baseline for sustainability requirements, the defense guidance states that the services should take other more demanding scenarios, with respect to munitions, into account, for example, a [deleted].

Fiscal year 1987-91 defense guidance mid-term objectives are as follows:

Level-of-effect munitions [deleted].

Threat-oriented munitions [deleted].

(Sufficient stocks to kill 100 percent of the threat allocated to U.S. Forces by the end of the fiscal year 1991 funded delivery period.)

The long-term goals are to provide: [deleted].

Dr. **Mandelbaum**. With that, I will turn it over to General Molinelli.

General **Molinelli**. Mr. Chairman, I have a short statement, but I would like to go through it. Let me find it.

Mr. Chairman, also in closed session, I would like to state I am quite aware that you have the figures for the 1987 to 1991 OSD/OMB budget submission which are in a state of change, as I informed you earlier, and, hopefully, they are in a positive state of change. I am not going to address those.

I am going to address the fiscal year 1986 to 1990 which are different from what you have been exposed to in the 1987 to 1991 figures.

CHART No. 1

ARMY AMMUNITION VERSUS THE ARMY BUDGET

[In billions of dollars]

	Fiscal year—					
	1981	1982	1983	1984	1985	1986
The Army budget	43.2	52.1	57.6	62.6	74.5	81.3
Army ammunition	1.6	2.3	2.1	1.9	2.6	2.6

ARMY AMMUNITION VERSUS ARMY PROCUREMENT

[In billions of dollars]

	Fiscal year—					
	1981	1982	1983	1984	1985	1986
Total Army procurement [1]	10.5	13.9	15.9	17.4	19.4	21.4
Army ammunition	1.6	2.3	2.1	1.9	2.6	2.6

[1] (Aircraft, missiles, WPNS & TCV, ammunition, OPA)

In this regard, I will put my first chart up. I would like to show you how the Army has allocated the ammunition funds in comparison to the total budget.

In that context, you can see it has been relatively constant with a perturbation in fiscal year 1984 and a little low in 1983.

Senator **Humphrey**. How is that reflected in the stockpile? How much of that increase is reflected in increased emphasis on purchasing sophisticated and presumably more expensive weapon munitions?

General Molinelli. I have a chart, here, that will address the stockpile and you will be able to compare that.

The first chart is intended to show you a dollar comparison against the total Army procurement. The second chart shows the same comparison, but on a percentage basis.

Chart No. 2

PROCUREMENT AMMUNITION, ARMY

[As a percent of the Army budget]

	Fiscal year—					
	1981	1982	1983	1984	1985	1986
Ammo hardware	3.0	3.8	3.0	2.9	3.2	2.8
Ammo production base	.7	.6	.7	.3	.4	.4
Total PAA	3.7	4.4	3.7	3.2	3.6	3.2

[As a percent of total Army procurement]

	Fiscal year—					
	1981	1982	1983	1984	1985	1986
Ammo hardware	12.4	14.4	10.7	10.4	12.2	10.6
Ammo production base	2.9	2.2	2.5	1.2	1.4	1.7
Total PAA	15.3	16.6	13.2	11.6	13.6	12.3

I think that is in the context of one of your earlier questions that the Army has maintained with the exception of that perturbation in 1984, a fairly constant funding stream to hardware and production based, both as a total Army budget and a percentage of the total Army procurement.

Senator Humphrey. I do not understand. What is the difference between the first two charts?

General Molinelli. One of them is in terms of dollars. Chart No. 2 is in terms of percent. The top line being against the total Army budget authority and the second services of these numbers below as a percent of the total Army procurement. I have heard some questions come out, are we robbing from the ammunition base by procuring M-1 tanks and some of the high priority items in the Army?

I think the response to that is that ammunition has pretty much maintained a level of effort. I do not think we are open for being hit around the head and shoulders for procuring more exotic weapon systems at the expense of ammunition. Ammunition has been fairly constant.

CHART No. 3

AMMUNITION TOA

[Based on fiscal year 1986-90 budget]

	Fiscal year—									
	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Hardware	1,209.4	2,020.5	1,717.5	1,830.9	2,365.7	2,266.6	3,593.1	3,580.3	3,840.3	4,523.7
Production base	353.1	304.6	404.5	149.5	280.6	368.4	457.9	903.0	932.2	934.2
Total	1,562.5	2,325.1	2,122.0	1,980.4	2,646.3	2,635.0	3,051.1	4,483.3	4,772.5	5,457.9

Chart No. 3 is a display of hardware and the production base in the fiscal year 1986 to 1990 submission. Currently before the committee, of course, is the 2.635 number.

The reductions in 1983 and 1984—you had at a previous hearing some questions on the impact of the GAO—those reductions were, in fact, the result of the GAO audits which recommended deletion of over $500 million and $331 million from what the Army requested.

[Chart 4 deleted.]

Now, chart No. 4 reflects a profile of the total aggregate ammunition Army days of supply. I think it is important to note that the top line is the modernized and standard munitions and you see a continual growth, not dramatic, but there has been some buildup.

This is the aggregate of all the Army's lines. The next line reflects modernized munitions without substitution. This line shows a more attractive growth.

You compare that to the Department of Defense guidance which asks us to achieve [deleted], of war reserve stocks by the fiscal year 1988 funded delivery period.

When comparing modernized and standard munitions, we have [deleted] Modern munitions only reflect [deleted].

Senator **HUMPHREY**. How significant is that yardstick?

Is that distorted by throwing in a whole bunch?

There are several hundred items involved.

General **MOLINELLI**. Yes, sir, there are.

Senator **HUMPHREY**. Is this distorted by throwing in a whole lot of relatively unimportant things like ammunition for whatever kind of sidarms we have these days?

General **MOLINELLI**. It is distorted somewhat by that, although we do not figure it on a line by line, a 100 percent of a new weapon or a 100 percent of an old weapon.

I do not think it is distorted. It is a generalization of our status, considering that it covers many hundreds of line items.

Now I will show you some examples. Give me the next chart, please, chart No. 5.

[Chart 5 deleted.]

I am going to show you the good and the bad side here so that you can see what distortion exists in that line. This chart number five shows you four items that we are in good shape on. These are high-priority-items that we are in good shape on.

The top line is illustrative of what happens when we have a change in requirements. That is a rocket-assisted projectile for the 155-millimeter howitzer. We would never program to buy to [deleted] of supply. But because we have a new type of round entering the system this round became second-best that is why we are reflecting [deleted] of supply.

Now, that figure would perturb the previous figure I showed you, but just a little bit because it is one of many items.

The other three figures are representative. These are high-priority items and they are representative of our stockpile and these are the better lines I am showing you. You can see by fiscal year 1988 we are still below the defense guidance of [deleted] but within ten percent or so.

So, those are the good news items.

[Chart 6 deleted.]

The next chart I would like to show you, sir, is some of the bad news stories.

Before we really get into it, I would say we need to realize that it does not show the substitution items that General Knudson discussed earlier. For instance, the first line is the 81-millimeter mortar.

Now, that is an improved range and improved lethality round that we are initially buying from the United Kingdom and then we will subsequently produce in the United States. It shows that in 1984 we have [deleted] of supply because it was a new round. It does not take into account the good news I showed you on the high-explosive 81-millimeter round which is not quite as long a range or not quite as lethal.

It does not take into account the substitution. It does show you that I am only [deleted] of supply in fiscal year 1988 simply because I have been unable to procure sufficient quantities of this round.

The Copperhead is somewhat of an anomaly and I think I ought to explain that. It shows that in fiscal year 1988 I get [deleted] of supply and I stay constant there. That is in accordance with Army's acquisition plan.

Until we are able to get the Aquila system and some other forward deployed systems to more effectively use the Copperhead round, we have decided to cap our procurement at that level and not go beyond the [deleted].

CHART NO. 7

AMMUNITION FISCAL YEAR 1986 SHORTFALLS

Item	Quantity in thousands	Dollars in millions
Cartridge 120MM APFS-DS-T M829	+38	+57.0
Cartridge 120MM Heat M830	+4	+11.1
AT-4	+24	+17.6
Rocket 2.75" HE	+236	+70.6
Projectile 8" HE RAP M650	+14	+16.0
Projectile 155MM RAAMS M741	+14	+23.6
Cartridge 7.62MM Blank	+23,235	+5.4
Cartridge 7.62MM 4 Ball/1 Tracer	+29,017	+8.2
Cartridge 81MM HE (UK)	+216	+51.0

The next chart I would like to show you sir; is the ammunition shortfalls in 1986. If you were to ask me where I might have the ability to put additional funds, these are the areas that I would like to put them in.

Incidentally, the note that came up when you asked me about 1987, I may have some funding to invest in these areas. These are critical needs for additional funding in 1986.

Senator HUMPHREY. Where are these items critical?

General MOLINELLI. The first two items are critical in that at the end of the funded delivery period in 1986, we are supporting the forward fielding requirement for the M1A1 tank.

I only have [deleted] and [deleted] of supply for that tank round, those first two rounds at the end of fiscal year 1986. The AT-4 we are buying to [deleted] level. The 2.75-inch rocket you see up there is training ammunition.

During the development of our program we went through some decrement. Funding for the training rocket was deleted. I would like to guy that back so that I could put it in the training base.

The next one, the high-explosive rocket assisted projectile for the eight inch, is a requirement change. So, it becomes critical. In 1986 it shows I have [deleted] of supply.

The programs I am working on drops it to [deleted] of supply in 1987 and that is because this becomes the preferred round at that time.

The next item is the 155-millimeter RAAMS and that is an artillery delivered mine program. We are dreadfully short in mine procurement across the board. This is a high priority. The highest priority that we have for the 155-mm Artillery Delivered Mine Program. That is why I say that is a critical item.

When I am talking about mines, sir; I also have to be very honest with you. You saw how mines came out in the analysis of the requirements. They were the third layer down which says given an intensity of conflict at a given level then our requirement for these bulk issue munitions is filled only after all threat-oriented and mission-oriented munition are satisfied.

I do not have either the funding or do we have the producibility to execute much more funding in the mines area. While we have a great shortfall in mines, we do not have the ability to execute dramatically increased amounts of funding in there because of the producibility difficulties that we are having with mines.

There are some where you could throw money at the problem and it will not help it at all and that is one of them.

Senator HUMPHREY. What is the productibility problem you refer to?

General MOLINELLI. We do not have sufficient lines operating in some cases to be able to dramatically improve the number of mines that come out of the other end of the process.

One of our important mines has had a problem in qualifying before we will produce it. We are making a limited run of them and it will not qualify.

General KNUDSON. The GEMSS mine did not pass the immersion test.

General MOLINELLI. We will not produce it, at any rate, until we correct that problem and have a good product.

Senator HUMPHREY. With regard to the capacity limited mine, it is still a vicious circle again. We produce our request at capacity and we do not have enough capacity and we do not have anything to improve capacity.

General MOLINELLI. I agree with the observation, Mr. Chairman.

Senator HUMPHREY. How many separate munitions are we talking about here, separate items?

General MOLINELLI. The Army has about 420 active line items. Of these 420 line items, approximately 150 are being procured in support of Army requirements. Then the Army, as the single manager for conventional ammunition, has another approximately 150 line items that belong to the Air Force, the Navy, and the Marines.

Senator HUMPHREY. Those total 420?

General MOLINELLI. The Army has 420 active line items in addition to approximately 150 for other services.

Senator HUMPHREY. Of those 420, how many are being fully funded?

General MOLINELLI. I would have to say none in fiscal year 1986. The 120-millimeter tank ammunition is fully funded in fiscal year 1987 through fiscal year 1991.

Senator HUMPHREY. In how many of these 420 instances are we capacity limited?

General MOLINELLI. Just in the mine area.

Senator HUMPHREY. What about the efficiency of production?

General MOLINELLI. I am sorry, sir, would you restate the question?

Senator HUMPHREY. I am going to have to go vote here. Let us hold it here. I am sorry that I have to interrupt again. I will be right back.

What I am getting at is, in how many cases are we cutting down on our request because we do not have the capacity to manufacture in efficient lots?

General MOLINELLI. All right, sir.

[Recess.]

Senator HUMPHREY. Let us resume.

What I was getting at, General Molinelli, is we discussed a couple of times during the hearing the fact that buys were sometimes on the justification that we do not have the production capability anyway. Am I right in that?

General MOLINELLI. Sir, I think that is not quite fair. The buys in the case of the ongoing program, which we must recognize as our peacetime programs and not our mobilization requirements, are only production constrained in the mine area.

In the other cases I believe we do have the production capability. We are running some lines, as I mentioned earlier, at a minimum sustaining rate rather than an economic rate, because we have insufficient funding to raise them to the economic rate of production.

Generally speaking, with the 1986 program most of our lines are running at uneconomical production rates. A portion of those are running at an economic rate.

Senator HUMPHREY. OK, let us continue. Who is next?

General WINGLASS. I believe I am, sir.

With the Chairman's permission, we changed the script just a little bit in an attempt to summarize. As you know, from the information we furnished previously, we would have about 15 different slides to show you in different categories.

With your permission, we will somewhat abridge that and go to just four.

If I could have the first one here, categorically what you would look at in the handout, sir, are several, I think about seven, different categories, all of which are consistent except the display for missiles, surface-to-air missiles, which instead of days of ammunition, speak to threat in terms of percentage to kill.

What we have here are physical assets, were we to go to 180-day level. If the requirement was satisifed completely, it would extend the bar to the top of the scale. We are looking at days of supply and these are, of course, the fiscal years. We are looking at two fields here.

One reflects the on-hand quantity of preferred items only. In any particular fiscal year indicated on the transparency we will have attained this level. Then if we applied substitutes, we would go up to this level here. [Deleted.]

You know from an expression of the defense guidance that this is pretty consistent with the defense guidance in terms of objective. We would probably get to the DG level a little before the guidance would so require.

[Deleted.]

If we put in subs, we are 111. In small arms, given the constraints that we have talked about, we feel that our levels are in pretty adequate shape.

Second, still talking about small arms, the delta between the top of this preferred pile and the 180——

Senator HUMPHERY. What are you basing the 1987 graph on? What kind of figures?

General WINGLASS. These are all in dollars.

Senator HUMPHERY. You are projecting into 1987 what you will have on hand?

General WINGLASS. Yes, sir, we are.

Senator HUMPHERY. On the basis of 1986 procurement?

General WINGLASS. In part, it is, but it is a measure of when we expect the ammunition to be delivered into inventory. It takes into account the production lead time that was talked about by General Molinelli early on. Sometimes it is 12 months. We know that some of that inventory could have been financed in 1985 or 1986, but it is now with us in inventory in these fiscal years.

Senator HUMPHERY. My point is that we are anticipating some kind of reduction, maybe not as great as was originally expressed around here lately, but some kind of reduction in the ammunition account. Have you taken that into consideration in the construction of these charts?

General WINGLASS. These charts are the President's public submission for 1986. We know what we put in, what we had forecast at this point of time. Our program has increased constantly.

Our 1987 ammunition is slightly below what it was in 1986. That is total expenditures. We expend about $500 million per year. In our case, it is a percentage higher than what has been expressed previously in terms of commitment to ammunition or allocation to ammunition.

We allocate a larger portion of our procurement money to ammunition than the numbers we heard about earlier. That is all done in the process of people sitting down and adjusting these programs to take into account our requirement to modernize as well as to sustain any other elements of consideration.

[Deleted.] We have no requirement whatsoever in small arms to get us to 60 days since we are already above that. So, in this particular category we do not have a requirement to bring us to the 60-day level.

[Deleted.]

So, the curve is down in that category as in most of the others if we were to take the time to look at them all.

This is our total program of all munitions put together. [Deleted.]

[Deleted.] Therefore, if we look at this snapshot of today in terms of total ammunition, the detailed charts will tell you where we are going and where we will be in 1991, but where are we today?

This, again, is only preferred munitions. It does not take into account the substitutes that are available to us. [Deleted.] Generally, I think you can see that we are consciously trying to pay attention and achieve the stipulated levels in the defense guidance.

[Deleted.] It is our stock in trade and we have to keep the buckets filled as much as we can.

I know we have abridged this somewhat, sir, in the interest of your time schedule. If you would like me to go back and spot some specifics, I will be willing to do so.

Senator HUMPHREY. Thank you.

General Davidson, if you would abbreviate yours to the extent possible.

General DAVIDSON. Colonel Carter has a very brief classified portion to terminate this portion of the presentation.

[Chart deleted.]

Colonel CARTER. As you recall, sir, I told you in the open session our munitions requirements respond only to the defense guidance. This calls for the support of the [deleted] scenario which includes the [deleted].

[Chart deleted.]

As General Molinelli pointed out, the DG level-of-effort sustainability objective is [deleted] by 1988 FDP and [deleted] by fiscal year 1991 FDP.

The DG direction for threat-oriented munitions is to have 80 percent of the requirement by [deleted] funded delivery period [deleted] and [deleted] percent of the requirement by the [deleted] funded delivery period it is to have 100 percent.

[Chart deleted.]

Now, looking first at our threat-oriented requirements. The outside circle represents [deleted] percent of our requirements. The smooth shaded area represents our current inventory at the end of the fiscal year [deleted] funded delivery period.

The procurement shown by the course shaded area is the step we have taken in the fiscal year 1986 authorization mark. Shortfalls exist in our munitions inventories however; we can march out to reach our requirement by the end of fiscal year 1986–90 funding for most munitions.

These are two items shown on the chart, DACAM and AMRAAM, that are not procurable at this time.

Looking at level of effort munitions, you can see the majority of these munitions are already in the inventory.

The outside circle represents [deleted] days. MK–82's, LGB's and CBUs are all Vietman war era munitions, but are still of utility to us.

We are buying some new items, CBU–87, the Combined Effects Munitions is quite good against a broad range of targets. You can see the growth we have in that program in the 1986 budget.

Weapons in development show great promise, but are not funded for procurement in 1986.

GBU–15 and AGM–130 are stand-off weapons, the GBU–15 has a range of about [deleted] miles, and the AGM–130 is good for about [deleted] miles. Maverick is our best anti-tank weapon.

Against the [deleted] sustainability objective, we are doing fairly well with most of these munitions. This translates to the combat sortie capability we show in this chart, in the form of the number of sustainable sorties over time.

[Chart deleted.]

The lower line shows the number of sorties loaded with the preferred munitions as described earlier in the open hearing. We can fill the full [deleted] day objective shown by the requirement line with some type of weapon.

The Air Force can fill up to [deleted] combat sorties, which is approximately equal to the [deleted] requirement, with munitions of some type.

That concludes the sustainability picture for the Air Force.

Senator HUMPHREY. That concludes the hearing for today, gentleman.

Thank you very much for your time and assistance.

[The following questions submitted in executive session by Senator Gordon J. Humphrey to be answered for the record.]

QUESTIONS SUBMITTED BY SENATOR GORDON J. HUMPHREY

Senator HUMPHREY. By what mechanism does OSD assure that the services are stockpiling similar "days of supply" of ammunition in Europe?

Dr. MANDELBAUM. Responses to the NATO Defense Planning Review Questionnarie indicate that no U.S. munitions problem is unique to Europe. Europe is given a very high priority for the allocation of munitions assets. Areas where we are below our objective are therefore world-wide problems.

Senator HUMPHREY. In computing requirements, do the services build in a factor for ammunition lost in transit, e.g., ships are sunk?

Dr. MANDLEBAUM. Data for the Army, Air Force, and Marine Corps are at attachments 1, 2, and 3, respectively.

ATTACHMENT 1

b. [Deleted.]
c. The airlift attrition rates for all theaters [deleted].

7-13. SEALIFT ATTRITION

a. Revised attrition factors, Tables 7-20 and 7-21, were taken from Tables 24/25, page 41 of the "DOD Sealift Study Attrition and Vulnerability Factors" Draft #6, dated 17 February 1983. Factors for the Arabian Sea and the Korean Straits as well as the South Atlantic are also included. The same attrition rates apply to fast independents as well as to slow convoys.

[Deleted.]

[Deleted.]

b. Convoy assumptions are presented in paragraph 7-24.

c. Insofar as convoy policy is concerned, each CINC has [deleted].

ATTACHMENT 2

e. In analyzing NATO combat ammunition consumption rates, assume that [deleted].

f. In computing planning or programming objectives, allowances are made for anticipated inter and intratheater materiel losses.

(1) [Deleted] note:

(2) The Office of the Secretary of Defense (OSD) authorizes a factor for [deleted.] The percentage of losses are as follows:

[Deleted.]

2. Our long-term sustainability planning goal is the support posture which, [deleted].

3. In recognition of the fact that [deleted].

ATTACHMENT 3

[Deleted.]

Senator **Humphrey**. Can DOD move the required tonnages of ammunition from CONUS location to Europe or other locations in the required time-frame during a war?

Dr. **Mandelbaum**. The U.S. and NATO flag fleets contain large numbers of containerships. These ships cannot move most items of unit equipment but can move ammunition. Our studies show. therefore, that there is adequate shipping to move existing and programmed CONUS stockpiles of ammunition in the required time-frame provided we preposition adequate stocks to cover consumption before the first ships can arrive.

WAR RESERVE REQUIREMENTS

Senator **Humphrey**. Are the war reserve requirements for the approved forces fiscally constrained?

General **Knudson**. No. The computation of the war reserve requirements portion of the Army acquisition objective is not constrained by resource availability. The sustainment period of the requirement is specified by Defense Guidance as implemented by the Army Plan. The period is currently [deleted] days. Attainment of the full [deleted] day sustainment requirement is beyond our capability, given budget contraints.

Defense Guidance also provides interim sustainability goals. These are [deleted] days by the end of the fiscal year 1988 funded delivery period and [deleted] days by the end of the 1991 period. Current budget limitations will not permit attainment of these interim goals.

CONVENTIONAL AMMUNITION

Senator **Humphrey**. How much of the requirements for conventional ammunition is planned to be filled in the fiscal years 1987 through 1991 program period?

General **Knudson**. Our budget profile for war reserve munitions versus the total amounts which would be required to "buy out" the total U.S. war reserve munitions requirements shortfall for each year of the program (in millions of dollars) is as follows:

	Fiscal year—				
	1987	1988	1989	1990	1991
War reserve budget			[Deleted]		
War reserve shortfall			[Deleted]		

In terms of sustainability, our fiscal year 1987 through 1991 program is expected to achieve the following in terms of days of sustainability for the war reserve munitions categories indicated and for the aggregation of those categories:

	Fiscal year—				
	1987	1988	1989	1990	1991
Anti-personnel:					
(Preferred munitions)			[Deleted.]		
(With substitutes)					
Anti-tank:					
(Preferred munitions)					
(With substitutes)					
Anti-material					
FASCAM					
Total:					
(Preferred munitions)					
(With substitutes)					

Senator HUMPHREY. Are the war reserve requirements for the approved forces fiscally constrained?

General DAVIDSON. Yes. As discussed in the methodology portion of the briefing, a "least-cost-to-kill" measure of merit is used to select weapons for war reserve requirements. This represents a fiscally constrained alternative to a "most-kills/lowest-attrition" measure of merit. Because of the methodology used, it is not possible to determine how much the war reserve requirements are fiscally constrained. Additionally, programming resources to satisfy the computed war reserve munitions requirement competes with other Air Force programs to develop a total Air Force budget which is fiscally constrained.

Senator HUMPHREY. Are the peacetime training requirements fiscally constrained?

General DAVIDSON. Yes. Training requirements are computed using our best judgment of what is needed to prepare our forces for their combat tasking. Procurement of training assets to meet requirements competes for resources with other programs in the development of a total, fiscally constrained, Air Force budget. Approximately 90 percent of our training requirements are supported in the fiscal years 1986–90 FYDP.

Senator HUMPHREY. How much of the requirement for conventional ammunition is planned to be filled in the fiscal year 1987 through 1991 program period?

General DAVIDSON. With the exception of some new munitions which do not enter production until late in the FYDP, the Air Force's investment of nearly $21 Billion during the fiscal years 1986–90 FYDP procures approximately 100 percent of our [deleted] sustainability objective and approximately 75 percent of our [deleted] "Consumption" long range goal.

Senator HUMPHREY. Are the war reserve requirements for the approved forces fiscally constrained?

General WINGLASS. No.

Senator HUMPHREY. Are the peacetime training requirements from fiscally constrained?

General WINGLASS. No.

Senator HUMPHREY. How much of the requirements for conventional ammunition is planned to be filled in the fiscal year 1987 through 1991 program period?

General WINGLASS. The unconstrained requirements for conventional ammunition to be filled in the fiscal year 1987 through 1991 program period by dollars and days of supply expected to be attained are:

Five-year defense plan:

1987	[Deleted].
1988	[Deleted].
1989	[Deleted].
1990	[Deleted].
1991	[Deleted].

*$ in thousands.

**Of unconstrained requirement.

QUESTION SUBMITTED BY SENATOR ALAN J. DIXON

SUSTAINABILITY OBJECTIVES

Senator DIXON. Dr. Mandelbaum, how close are each of the Services to attaining the mid-term sustainability objective in both level-of-effort and threat-oriented munitions which you mention in your classified statement?

Dr. MANDELBAUM. For many items the objectives are met but for many they are not. As part of the process to develop the Defense Guidance, the following estimates were made of the part of the shortage against the Defense Guidance that could be produced if funding were available:

	Objective	
	Fiscal year 1988	Fiscal year 1991
Army	[Deleted]	[Deleted].
Navy		
Air Force		
Marine Corps		

[Whereupon, at 5 p.m., the subcommittee adjourned, subject to the call of the Chair.]

DEPARTMENT OF DEFENSE AMMUNITION REQUIREMENTS AND PRODUCTION BASE

WEDNESDAY, DECEMBER 11, 1985

U.S. Senate,
Subcommittee on Preparedness of the
Committee on Armed Services,
Washington, DC.

The subcommittee met in open session pursuant to notice, at 2:04 p.m. in room SR-222, Russell Senate Office Building, Senator Gordon J. Humphrey presiding.

Present: Senators Humphrey and Dixon.

Staff present. Ronald P. Kelly, professional staff member; Patricia L. Watson, research assistant; Lisa M. Tietge, staff assistant.

Also present: Charles C. Smith, assistant to Senator Dixon.

OPENING STATEMENT BY SENATOR GORDON J. HUMPHREY, CHAIRMAN

Senator **Humphrey**. This afternoon the subcommittee will continue its hearing into the state of our ammunition stockpiles and production base. There are a number of GAO and defense studies which indicate a substantial shortfall in the production base capability.

The witnesses this afternoon are Maj. Gen. Robert S. Molinelli, U.S. Army, Director, Combat Support Systems, and Brig. Gen. Guy P. Bowen, U.S. Army, Deputy Director for Conventional Ammunition.

Gentlemen, I have not had time to read your statements for the record, so let us—I will ask you to read those in full, rather than summarizing them. That will kill two birds with one stone.

STATEMENT OF MAJ. GEN. ROBERT S. MOLINELLI, U.S. ARMY, DIRECTOR, COMBAT SUPPORT SYSTEMS, OFFICE OF THE DEPUTY CHIEF OF STAFF FOR RESEARCH, DEVELOPMENT, AND ACQUISITION, DEPARTMENT OF THE ARMY

General **Molinelli**. Mr. Chairman and Senator Dixon. I am General Molinelli and I will—I have a rather short statement I'd like to present to you at this time, and then I have some comments that I think will be able to help us with what we discussed yesterday.

AMMUNITION PRODUCTION BASE OVERVIEW

The ammunition production base in the United States was established in World War II and served us well through Korea and Vietnam. It is a large base and has a replacement value of $23 billion.

We face changes in the state of the art in munitions manufacturing technology and changes with respect to pollution control and stricter safety standards which require improvements and corrections to the base. To this end, the Army has invested since 1970 some $3.4 billion in the modernization and expansion of the ammunition base. As a result, we were able to build a new plant in Mississippi for production of the 155 millimeter improved conventional munition ammunition, we built five automated lines for the manufacture of 5.56 ammunition at Lake City Army Ammunition Plant, we built 14 continuous TNT manufacturing lines at Radford, Joliet, and volunteer Army ammunition plants, and built automated single and double-base lines at Radford, here in Virginia, and we built a nitroguanidine plant at Sunflower, and built a black powder plant at Indiana.

In the commercial sector, the Army has 157 current producers with mobilization agreements that make up part of its base for peacetime and mobilization requirements. In addition, there are many firms that produce some types of components or material for use in ammunition production. In this area, the Army modernized the facilities of National Presto and Amron in Wisconsin and Norris Industries in California.

The Army, as the Defense Department's central procurement and production manager for conventional ammunition, plays a major role in identifying shortages in the production base against the stated requirements of the military departments. The single manager operates virtually all of the Government-owned production base used in full-scale production of conventional ammunition.

SINGLE MANAGER

A sizable share of conventional ammunition requirements are produced by the private sector, especially the metal parts and the components that are ultimately loaded, assembled, and packaged in the Government-owned facilities. For conventional ammunition items and components produced by the private sector, the single manager is the procuring agent.

There are two aspects to managing the Government-owned base. First, the Single Manager must ensure that the base can produce the funded and planned peacetime requirements of all the services in a balanced and efficient manner; and that production capabilities are modernized and expanded to keep pace with the higher technical requirements of ammunition now in development.

The second major production base responsibility of the Single Manager is to ensure a mobilization capability within the base. This means considering first how well that part of the base that is not being used for peacetime production can be applied to mobilization requirements, and, second, how long will it take to bring the mobilization base up to full production capability.

Much has been done to improve the production base and still more, admittedly, a lot more needs to be done. Gen. Guy Bowen is with me today as the Deputy Executive Director for the Single Manager for Conventional Ammunition. He is responsible for the operation of the Government-owned Conventional Ammunition production base for all services and does the contracting for associated procurements from the private sector.

He is the Deputy Executive Director for Conventional Ammunition and will describe the current condition of the base and what is needed to meet the mobilization requirements.

Senator HUMPHREY. Fine.

General Bowen.

STATEMENT OF BRIG. GEN. GUY P. BOWEN, DEPUTY EXECUTIVE DIRECTOR FOR CONVENTIONAL AMMUNITION, DEPARTMENT OF THE ARMY

General BOWEN. Mr. Chairman, attached to your handout, sir, are three charts. Since I was only going to use three, I provided them to you, and I will talk to them as we get to them.

The Defense Industrial Reserve Act provides for the retention of essential Government-owned plants. The Army Arsenal Act and the Competition in Contracting Act allow the Army to produce at these plants to satisfy Single Manager for Conventional Ammunition [SMCA] requirements during peacetime and mobilization.

The SMCA is responsible for maintaining an integrated production and logistics, to include wholesale supply and maintenance management, demilitarization and disposal, transportation and traffic management—base to meet peacetime, surge, and mobilization requirements for these assigned munitions.

The SMCA oversees operations in two arsenals and the 28 Government and contractor-operated ammunition plants, 17 active and 11 inactive, which make up the Government-owned ammunition production base.

AMMUNITION PLANTS

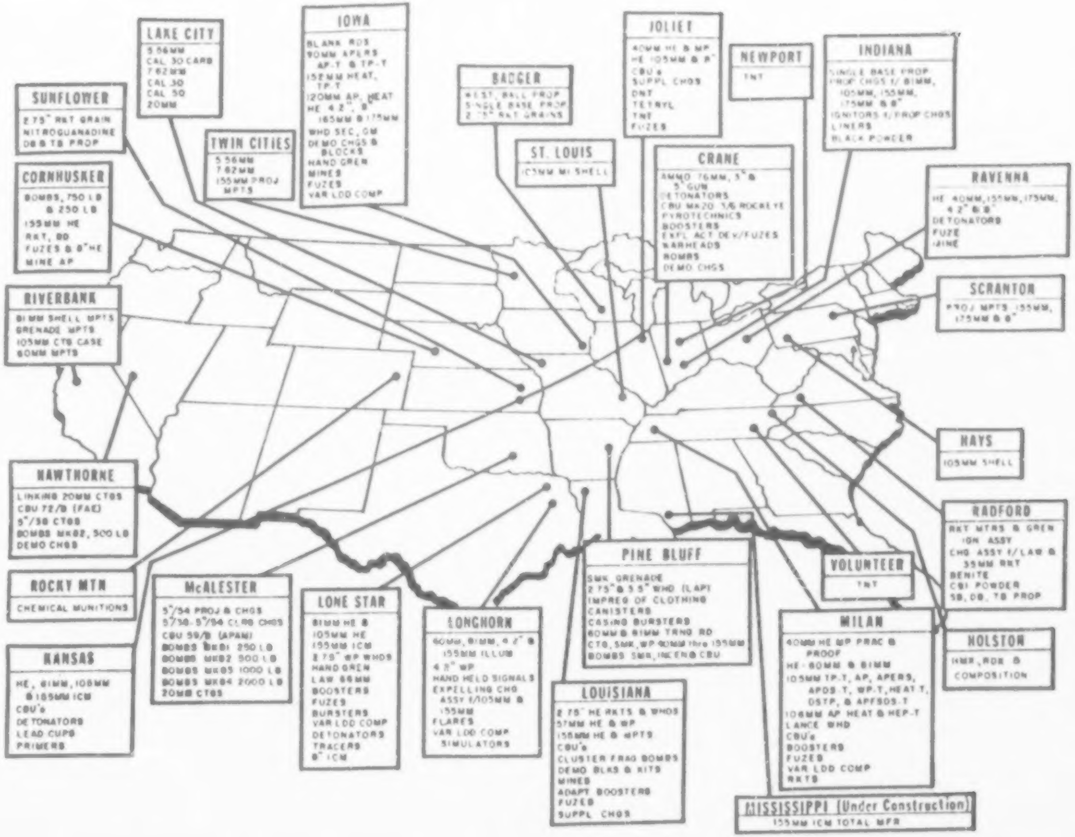

SUNFLOWER
2.75" RKT GRAIN
NITROGUANADINE
DB & TB PROP
CORNHUSKER
BOMBS, 750 LB
& 250 LB
155MM HE
RKT, BD
FUZES & 8" HE
MINE AP
RIVERBANK
81MM SHELL MPTS
GRENADE MPTS
105MM CTG CASE
60MM MPTS
HAWTHORNE
LINKING 20MM CTGS
CBU 72/B (FAE)
5"/38 CTGS
BOMBS MK82, 500 LB
DEMO CHGS
ROCKY MTN
CHEMICAL MUNITIONS
KANSAS
HE, 81MM, 105MM
& 155MM ICM
CBU's
DETONATORS
LEAD CUPS
PRIMERS
LAKE CITY
5.56MM
CAL .30 CARB
7.62MM
CAL .30
CAL .50
20MM
TWIN CITIES
5.56MM
7.62MM
155MM PROJ
MPTS
IOWA
BLANK RDS
90MM APERS
AP-T & TP-T
152MM HEAT,
TP-T
120MM AP, HEAT
HE 4.2", 8"
165MM & 175MM
WHD SEC, GM
DEMO CHGS &
BLOCKS
HAND GREN
MINES
FUZES
VAR LDD COMP
BADGER
WEST. BALL PROP
SINGLE BASE PROP
2.75" RKT GRAINS
ST. LOUIS
105MM M1 SHELL
JOLIET
40MM HE & WP
HE 105MM & 8"
CBU's
SUPPL CHGS
DNT
TETRYL
TNT
FUZES
CRANE
AMMO 76MM, 3" &
5" GUN
DETONATORS
CBU MK20 3/6 ROCKEYE
PYROTECHNICS
BOOSTERS
EXPL ACT DEV/FUZES
WARHEADS
BOMBS
DEMO CHGS
NEWPORT
TNT
INDIANA
SINGLE BASE PROP
PROP CHGS f/ 81MM,
105MM, 155MM,
175MM & 8"
IGNITORS f/PROP CHGS
LINERS
BLACK POWDER
RAVENNA
HE 40MM, 155MM, 175MM,
4.2" & 8"
DETONATORS
FUZE
MINE
SCRANTON
PROJ MPTS 155MM,
175MM & 8"
HAYS
105MM SHELL
RADFORD
RKT MTRS & GREN
IGN ASSY
CHG ASSY f/LAW &
35MM RKT
BENITE
CBI POWDER
SB, DB, TB PROP
HOLSTON
HMX, RDX &
COMPOSITION
VOLUNTEER
TNT
MILAN
40MM HE WP PRAC &
PROOF
HE-60MM & 81MM
105MM TP-T, AP, APERS,
APDS-T, WP-T, HEAT-T,
DSTP, & APFSDS-T
106MM AP HEAT & HEP-T
LANCE WHD
CBU's
BOOSTERS
FUZES
VAR LDD COMP
RKTS
MISSISSIPPI (Under Construction)
155MM ICM TOTAL MFR
PINE BLUFF
SMK GRENADE
2.75" & 5.5" WHD (LAP)
IMPREG OF CLOTHING
CANISTERS
CASING BURSTERS
60MM & 81MM TRNG RD
CTG, SMK, WP 40MM thru 155MM
BOMBS SMK, INCEND CBU
LOUISIANA
2.75" HE RKTS & WHDS
57MM HE & WP
155MM HE & MPTS
CBU's
CLUSTER FRAG BOMBS
DEMO BLKS & KITS
MINES
ADAPT BOOSTERS
FUZES
SUPPL CHGS
LONGHORN
60MM, 81MM, 4.2" &
155MM ILLUM
4.2" WP
HAND HELD SIGNALS
EXPELLING CHG
ASSY f/105MM &
155MM
FLARES
VAR LDD COMP
SIMULATORS
LONE STAR
81MM HE &
105MM HE
155MM ICM
2.75" WP WHDS
HAND GREN
LAW 66MM
BOOSTERS
FUZES
BURSTERS
VAR LDD COMP
DETONATORS
TRACERS
8" ICM
McALESTER
5"/54 PROJ & CHGS
5"/38-5"/54 CLRG CHGS
CBU 59/B (APAM)
BOMBS MK81 250 LB
BOMBS MK82 500 LB
BOMBS MK83 1000 LB
BOMBS MK84 2000 LB
20MM CTGS

CHART 1

The first chart gives you an indication of the geographical location of these Government-owned plants, and also the type commodities that they are capable of producing. Mobilization master planning at these Government-owned installations determines the construction required to maximize the output of these existing facilities. A recent analysis within the last 6 months shows that all existing facilities and real property are required and that an additional four facilities would be necessary to support mobilization. The Army is currently looking for sites to reserve for these additional four facilities.

There are no current studies which discuss the feasibility of closing Government-owned plants during peacetime.

Government-owned plants perform 30 percent of production base activity, while industry or contractor-owned facilities perform 70 percent. Forty percent of the activity which is awarded to the Government-owned facilities is subsequently distributed to commercial industry. On almost a daily basis, the SMCA, through its operating agency, the Army Munitions and Chemical Command at Rock Island, IL, conducts business with over 500 firms and their 2,000 second and third tier subcontractors. Formalized mobilization planning—as Major General Molinelli indicated—is conducted with 157 of these producers.

Thus, our industrial preparedness planning process relies heavily upon the commercial sector. The process is driven by the mobilization requirements of the user—the Army, Navy, Air Force, and Marine Corps. Requirements for common components, such as propellants and explosives, and for end items used by more than one service are consolidated to determine total requirements.

Mobilization planning schedules are then sent to planned contractors and to the Government base. The capability of the base to meet these schedules is validated. Resulting shortfalls and other deficiencies are analyzed and corrective actions or industrial preparedness measures are developed and programmed to ensure a responsive industrial base for mobilization.

A 1983 GAO review of the Army's Modernization and Expansion Program for the ammunition production base recognized that the Army's goal is to have a modern, balanced, and responsive production base capable of meeting peacetime and wartime needs in the most efficient and economic manner. Modernized facilities require less time to start up, reduce unit production costs, and eliminate numerous environmental, health, and safety hazards associated with older production facilities.

The 1983 report found that, although the U.S. production base has a tremendous capability and can generally produce the planned peacetime procurement of ammunition, it lacks the capability to produce a large part of the projected mobilization requirements for many newer, more sophisticated ammunition items, such as the 81 millimeter mortar ammunition we talked about yesterday.

The report identifies serious problems with the ammunition production base and cited numerous shortfalls and imbalances in production capacities for various ammunition components. It found that many inactive production lines could not be reactivated as quickly as desired for mobilization because of equipment voids and other deficiencies.

AMMUNITION PRODUCTION BASE STUDY

As a result, the Congress requested the Army conduct an ammunition production base study, which was completed in February 1984. A report was submitted to the Armed Services and Appropriations Committees of the Senate and the House of Representatives in April 1984 on the status of production equipment, evaluation of the capability of the facility to produce quantities and types of ammunition requested in the 5-year development plan, and the estimate of the cost of developing and maintaining an ammunition production base capable of satisfying the anticipated peacetime and mobilization production requirements throughout the remainder of this century. The report recommended initiatives for addressing the ammunition production base problems.

Now, to be more specific, the ammunition production base has a $65.2 billion challenge. The shortfall in the ammunition production base can best be categorized as follows, and I refer you to chart number two:

CHART 2

Production base shortfall

	Billions
Plant deficiencies	$2.54
Equipment voids	.27
Mob shortfall current items	35.13
Mobilization shortfall	27.29
Total	65.23

The deficiencies in our current Government-owned facilities—this is real property, utilities, powerplants, waste recovery measures—amounts to $2.54 billion.

Equipment voids, both in the Government-owned and contractor-operated plants and in the contractor-owned, contractor-operated plants, amounts to $270 million, or $0.27 billion.

EQUIPMENT VOIDS

The expansion required to meet mobilization requirements for current ammunition items—in other words, today's problem—is $35.13 billion.

The expansion required to meet requirements for items expected to come into the inventory, those still in the conceptual stage right now or in R&D, is estimated to be $27.29 billion.

Projects supporting non-FYDP (five-year defense plan) expansions, cost savings, OSHA/EPA [Occupational Safety and Health Administration/Environmental Protection Agency] requirements, and those projects supporting modernization, surge, sustainability, and mobilization go unfunded. In general, our chemical plants propellants and explosives, need more intenstive correction, while our load, assemble and pack plants, or LAP plants, are in much better condition.

Let me cite specific examples of the type of short falls that exist on current production lines. Our industrial planning indicates we should produce in the ammunition production base 351 ammunition end items in the event of mobilization. Deployment day to production day analyses of these end items show that 87, or 25 percent, have significant production base shortfalls. Of 1,016 planned components, 476 have shortfalls.

In the case of Sunflower Army Ammunition Plant, which produces propellents, they are real property projects valued at $102 million and equipment projects valued at $102 million and equipment projects valued at $13 million.

At Radford Army Ammunition Plant, which also produces propellants, the real property projects are valued at $176 million and equipment projects valued at $64 million.

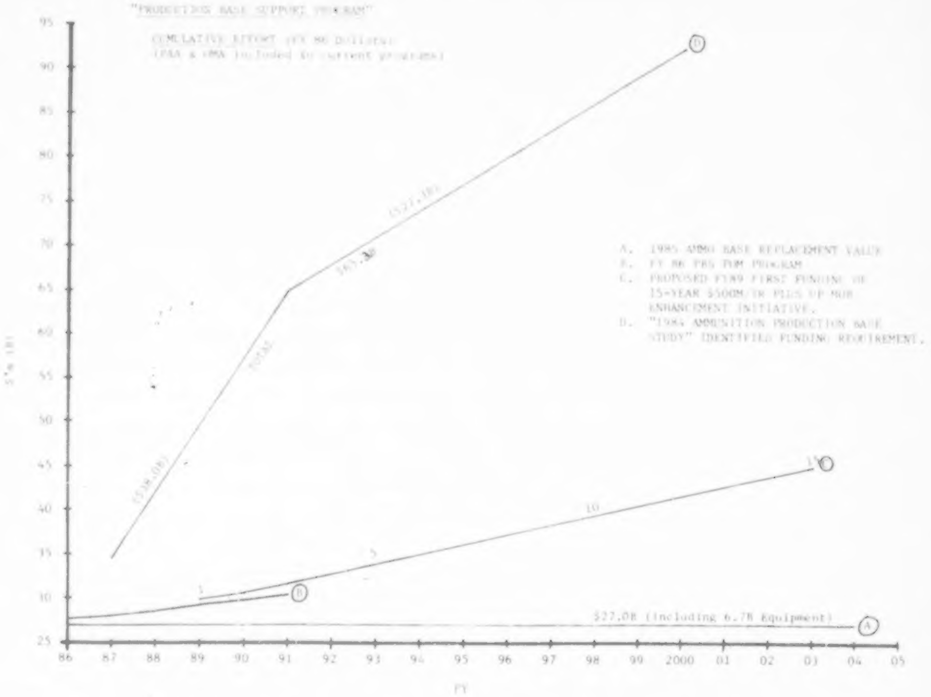
Lone Star, a load, assembly, and pack plant, requires real property projects valued at $91 million and equipment projects valued at $30 million.

And Scranton, a metal parts plant, requires real property projects valued at $26 million and equipment projects valued at $52 million.

With the immediate application of funds at the start of mobilizations, it will take an average of 12 to 18 months to correct production base deficiencies and meet mobilization requirements.

The Army has not been standing still, as General Molinelli indicated. There have been substantial improvements with projects required for initial production to support the FYDP requirement and safety projects. In fiscal year 1986, the Army intends to provide $368.4 million for these projects, and in addition approximately $117 million in OMA [Operational Maintenance Appropriation] for care and maintenance of laid-away facilities.

The remainder of the POM [Program Objectives Memorandum] includes such efforts as the modernization of Holston Army Ammunition Plant, our only RDX/HMX plant, a new RDX plant, a new HMX plant, and facilities for the 105/120 millimeter tank ammunition program, the 155 mm base bleed artillery ammunition, Volcano, MICLIC [Mine Cleaning Line Charge], and a new Air Force bomb and munitions.



I would like to summarize the production base challenges and initiatives with this next chart. Chart No. 3, line A at the bottom of the chart portrays the current worth of the production base. The funded line, line P, is that necessary to accomplish the expansion to accomplish the FYDP quantities.

Line C on the chart represents our 15-year Ammunition Production Base Enhancement Program to improve the capability of all items to at least 40 percent of their mobilization requirements. If funded, this 15-year, $500 million per year enhancement program offers a feasible solution toward building an ammunition base to satisfy mobilization production requirements.

The initiative balances the production base for the highest priority end items, identifies how additional resources could optimally be applied to obtain substantial and lasting improvements to the readiness posture of the ammunition industrial base.

This funding will be over and beyond the existing funded fiscal year 1986 to 1990 production base program. The top line on the chart, line D, is that required to produce FYDP quantities and meet mobilization requirements through the year 2000. The $65 billion actually is the total to the year 2000.

That completes my statement, Mr. Chairman. We're now prepared for questions.

Senator DIXON. Mr. Chairman, if I could ask several questions, because I have a 3 o'clock appointment.

I wonder to what extent, may I ask each of you, this report might be wishful thinking, which is to say that, as my colleague Senator Humphrey and I sit with you here today, on the floor we are entering the final stages of the debate on Gramm-Rudman-Hollings, which will pass and which in the opinion of many of us will result in very sharp reductions in military spending over the next several years, notwithstanding the prior commitments made for 3 percent growth during the several out years.

I think one can say that clearly that is not part of what each of us anticipates in view of Gramm-Rudman. Now, following that up with what we all understand past experience to be, which is that ammunition seems to take it in the neck first when there are cutbacks and reductions, I wonder, General Molinelli and General Bowen, whether you could enlighten us about how it looks from where you sit.

General MOLINELLI. Well, your summation is very accurate. It looks very dim from where we sit. As you know, we historically spend our money over time, and to accomplish the reductions that we see in light of the forthcoming law we would have to take out of 1986, which is three times the amount that would be required over time to achieve a reduction of any magnitude.

The way the law is written, we would have to achieve the decremented amount in 1986, and of course we use our funds to—we spend most of it in the first year, a lesser amount in the second year, and terminate all the rest of it in the third year.

So it would require taking two to three times as much money out of an already, in my opinion, too low ammunition budget. We are looking at a reduction in 1987 of about 12.5 percent below growth, negative growth, unless we do get some relief, which I hope, as I indicated to the Chairman yesterday, that there may be some further relief than the 1987 numbers that you saw.

Senator DIXON. What does this do to our general readiness, our capability, when we have this occur?

General MOLINELLI. It will have an impact. We won't know how significant that impact is, until we do some figuring and we know the size of the bill that the Department has to pay, that the service has to pay, I could not tell you what the total degradation would be.

Senator DIXON. Many of us feel that we should perhaps be spending less on some of the highly sophisticated stuff and doing more to try to take care of these nitty-gritty requirements. I do not think there is anything more important than readiness in the area of ammunition and things of that kind.

What can you gentlemen do to impress that upon the people at the top that are going to make these finite decisions pretty quickly, I think, in the next new year?

SMART MUNITIONS

General MOLINELLI. Well, when we are speaking of procurement dollars, I think I can correctly state that the Army's goal is to go to, we refer to them as smart munitions, and as I indicated to you yesterday, there are various degrees of smartness.

But for instance, some of the improved field artillery ammunition, hopefully, when we get everything we want lined up to further employ Copperhead, that should enable us to have a lesser requirement for conventional munitions. We would then be able to divert some of the funds from conventional munitions into smarter weapons. So I think the overall objective of the Army is to pursue smart weapon technology.

We have very limited procurement funds in smart weapons. As a result we have not been able to build very many of them.

Senator DIXON. Well, may I say, General Molinelli and General Bowen, I hope that people like you will stress with those you deal with and send the message to the highest authorities in our Government that many of us at this level in the Congress, and certainly I think most of us in the Senate Armed Services Committee that I visit with, Mr. Chairman, feel very strongly that ammunition takes it in the neck all the time; and this is a place that we ought not to be making these dramatic reductions, and that our readiness and capability to respond in necessary emergency situations depends upon adequate supplies.

And I hope that that is something that they understand at the top.

General MOLINELLI. I will certainly carry your message. I carry it, perhaps not effectively enough, all the time. Of course, I fight for this appropriation.

I also need to explain to you, that you had General Knudson here yesterday, who is in the requirements business. What I am trying to do is identify our positions in the service. General Knudson is in the requirements business and he works in DCSOPS, as a matter of fact, a position which I previously held. I understand to some degree, hopefully a good degree, the requirements determination and the process which it goes through and the prioritization of spending our money.

I am now on the other side of the house and responsibile for this appropriation and its application in procurement. General Bowen works for the Army Materiel Command and is responsible to work through the Director for—Single Manager for Conventional Ammunitions, which is Lieutenant General Skibble in the Army Materiel Command. We all work together very hard to try to increase the ammunition procurement capability.

In fact your assessment is correct. We do seem to take it in the neck far too frequently, and I am passing the message up the line and I think I am being heard. As we indicated yesterday, there was some glimmer of relief from our proposal for the 1987 budget, in that we might be able to plus it up from other Army and other service appropriations or from distributions within the Office of the Secretary of Defense by some half a billion or a billion dollars.

Senator DIXON. You touched on an interesting thing when you used the word "prioritization" in your comments, because I think we are coming to that phase now over the next several years.

I am a new member of the Armed Services Committee, only completing my second year. But speaking as a person who has been in the Senate 5 years, only been on the Armed Services 2 years, I sense that there was less of that in the last several, during the significant growth that took place.

And I think it is clear, Mr. Chairman, that we are back into the phase of making these priority determinations, increasingly so, I would suspect, in the next several out years, probably to the chagrin of everybody and with a great deal of pain and suffering spread around everywhere.

PRIORITIZATION

But it continually concerns me that my sense of it in this committee—and I am way down at the end of the table, but my sense of it is that generally speaking in the committee most of us feel that it is very important to do the right thing in the area of ammunition needs, and that even in the past when there was not too much need for prioritization not enough was done in that area.

And we hope that the message relayed to those at the top is that we will examine the question pretty closely. We do not want to see this cut back to a few days readiness while you do a lot of other expensive things that in the judgment of us, at least, here in the committee is not the best place to be spending money.

I know you share that view.

General **Molinelli**. I do share that view, yes.

Senator **Humphrey**. Gentlemen, I want to begin by asking you some questions about your testimony. Let us look at this chart number one, the map. (See chart 1, p. 70.) Are these both Government-owned and contractor-owned facilities shown?

General **Bowen**. These are the Government-owned, contractor-operated.

Senator **Humphrey**. This is all Government real estate?

General **Bowen**. Yes, in addition some of these are Government-owned, Government-operated. This is Government real estate, yes, sir.

Senator **Humphrey**. What is the history of how these plants were sited over the years? Were most of these built during World War II or sited at least, the facilities, not necessarily the buildings, but I mean the real estate and the sites were chosen in World War II? Is that the story?

General **Bowen**. Yes, sir. At the end of World War I, the plants were almost completely disassembled, and starting in World War II we had to start rebuilding plants all over again.

AMMO PLANTS

As you may know, we had 92 plants in operation at the time World War II ended, and were still planning and building additional plants. The Defense Industrial Reserve Act that I mentioned and the Army Arsenal Act were designed to allow us to maintain plants, either active or inactive, so that we would not be faced with that challenge again.

But yes, those plants were built in World War II, except for one, Mississippi Army Ammunition Plant, which is under construction now.

Senator **Humphrey**. Well, the few I have seen encompass enormous acreage. Why is it necessary to have so much associated acreage, most of which seems to be empty or at least maybe occupied by bunkers no longer used?

General **Bowen**. This is the big difference in what the commercial sector is willing to undertake versus what the in-house production base undertakes. That acreage is required because in the explosive type business and the propellant type business and also in the load, assembly, pack type business, we are handling live explosives, a tremendous amount of distance is a safety requirement and acreage is required to provide a buffer zone for the civilian population around it.

Senator HUMPHREY. It strikes me you could drop an atomic weapon on some of those and you would still have enough buffer zone around them. Anyhow, that is just a subjective observation. Some of them are huge. I just wonder if some of that cannot be disposed of.

But that is secondary, in any event, to our other concerns. General Molinelli, you addressed the 1980 GAO report and you say that the report recommended initiatives for addressing the ammunition production base problems. What are those recommended initiatives?

15 YEAR ENHANCEMENT PROGRAM

General BOWEN. The initiative as a result of that GAO report was the 15-Year Enhancement Program, the program we speak of where we would put $500 million each year toward improving the production base for mobilization.

Senator HUMPHREY. The recommendation was spend more money, but on what?

General BOWEN. Realizing that the $65 billion figure is way up at the top of the chart, it appeared to be a practical approach. The money that we would spend is for facilities.

Senator HUMPHREY. What does that mean?

General BOWEN. "Facilities" means that in the case of these ammunition plants, where they have been there since World War II, to support the surge and mobilization requirements it takes additional powerplants, it takes additional steamplants.

The new EPA standards that we are under, require additional waste water, means to dispose of that waste water. Some of the buildings need to be replaced. It also includes the plant equipment packages, the equipment that is in the existing plants on Government-owned property, as well as the equipment that is in the commercial sector that the Army owns.

Senator HUMPHREY. $65 billion in plant and equipment?

General BOWEN. $65 billion in plant and equipment through the year 2000. Now, that also includes new ammunition that is coming into the—still in R&D and conceptual right now, but that would require expanded modernization efforts to produce the new ammunition that we still have coming off the drawing board.

Senator HUMPHREY. Let us discuss the second chart. The study said that we have $2.5 billion in plant deficiencies. That is buildings. You need to build, to construct more buildings. Is that current or rehabs or both?

General BOWEN. Plant deficiencies would be the buildings, yes, sir.

General MOLINELLI. The deficiencies that are seen there, sir, I think can be best explained by additional buildings, renovations, additional steam facilities, powerlines, water facilities, in that manner of speaking. There is also some equipment that needs replacement and updating.

Senator HUMPHREY. $270 million, according to that chart. That is what you are talking about?

General MOLINELLI. Yes, sir.

Senator HUMPHREY. What is the total worth of our equipment minus plant? Does anybody know?

General BOWEN. The equipment minus plant is approximately $6.7 billion.

EQUIPMENT MINUS PLANT

Senator HUMPHREY. Is that mostly World War II vintage? Can you characterize the state of or the age of that equipment? Where do we stand there? Has that been generally gradually modernized over the years or is that mostly World War II stuff?

General BOWEN. I would have to say that only a small percentage of that is basically World War II equipment; most of it has been modernized throughout the years. Certainly any items that we're now producing and any items that we're planning to produce, we are modernizing a line to produce those items and that is a part of the production base.

Senator HUMPHREY. All right. What does the line "mobilization shortfall current items" mean, the third item on the second chart? (See chart 2, p. 72.)

General BOWEN. As I said, the $35.13 billion is today's problem. That is the figure that I need to be able to produce up to mobilization today. The figure right below that is additive and would include what I need to be able to produce the new ammunition that is coming into the inventory through the year 2000.

The $35.13 billion figure includes additional facilities, improvements to existing equipment, to provide us the today go-to-war capability.

General MOLINELLI. Mr. Chairman, in the characterization of the plants it is probably not fair to say that, the World War II characterization. As General Bowen indicated, some of it has certainly been modernized and is currently being modernized.

But we must recognize that we also had Korea, where we had substantial investment in the ammunition plants, and we also had Vietnam, where we had a substantial investment in the ammunition plants. And then we have had continued investment of limited sorts since 1970.

Senator HUMPHREY. I guess I am looking at General Bowen's testimony at the moment. The next to the last page near the top, you say that, with the immediate application of funds at the start of mobilization, it will take an average of 12 to 18 months to correct production base deficiencies to meet mobilization requirements.

MOBILIZATION PLANS

Was that taken into account in our mobilization plans? What are we going to do between when we run out of days of supply in many of these items and the 12 to 18 months that it would take? We have only a period of a few months of stockpile of various items, at best. You say it would take 12 to 18 months to get production base deficiencies corrected to meet mobilization requirements.

What do we do in the interim?

General MOLINELLI. Mr. Chairman, the requirements, when we came up with them yesterday, we talked about a global scenario, and if we were in that scenario with the three fronts running, then it would frankly be very difficult to keep all of them running at the same intensity. We would have to tone down the intensity.

If we operate on a required supply rate and an available supply rate, very frankly, if we went to war in the total context of the scenarios that were described to you yesterday, there would be a shortfall and we would have to tone down the context of the war and go with an available supply rate and not be able to conduct the war with the same intensity in all theaters.

If it were in one theater, then we have the ability, we believe, to divert some of the ammunition that is planned for the other theaters to be used in that one theater. But we would still see ourselves faced with an available supply rate, a restriction factor that is commonly used.

We have used it, as far as I know, beginning in World War II and perhaps well beyond that. You have *x* number of rounds to use today and that is all that you are allotted, and that would be part of the operations orders that are issued to the commands.

Senator **Humphrey**. All right. That is as far as we are going to go today. We will be having further hearings into this matter.

Thank you very much.

[Questions with answers supplied follow:]

Questions Submitted by Senator Gordon J. Humphrey

AMMUNITION PRODUCTION BASE

Senator **Humphrey**. I understand that we have a large privately-owned base for small arms. Can you comment on how we or do we use them in meeting our mobilization requirements?

General **Molinelli**. A relatively large commercial capacity for small arms ammunition does exist. For this reason there is no need to conduct mobilization planning for such ammunition items as .22 Cal ball, 28 Cal ball and shotgun cartridges. Many other small arms ammunition items are used in quantities for which there is no commercial capacity. As an example the mobilization requirement for 5.56mm ball ammunition is 65,307,550 rounds per month. Commercial capacity cannot respond to these tremendous Department of Defense requirements within desired production lead items and unit costs. Therefore, these specialized and high use munitions are largely procured from the Government-owned Contractor-operated production base.

Senator **Humphrey**. What are third party contracts and are many Government-owned plants using third party contracts to reduce their overhead?

General **Molinelli**. Third party contracts are direct contracts between systems contractors and the operating contractors of our Government-owned facilities. With this arrangement, systems contractors and private contractors can utilize the Government-owned production base without Government intervention. Benefits which are obtained for the Government in this arrangement are reduced overhead charges at our installations and integrity of the systems contract approach. Twelve of our Government-owned Contractor-operated plants currently participate in the program.

Senator **Humphrey**. If additional funding became available for the improvements of the base, how much could you use and how would you use them? What design funds and how long would it take to prepare projects that would be executable in any given year.

General **Molinelli**. To obtain the maximum improvement for the dollar, additional funding for the mobilization production base would be applied to those components of high priority ammunition items which restrict end item production. The funds would be utilized primarily on improving the propellant and explosive base, load assemble and pack and modernize the support facilities in the plants (i.e. power houses, electrical water and gas systems, etc.) A well conceived fiscal year 1989-fiscal year 1998 improvement program of up to $500 million per year could improve almost every ammunition end item to a level of approximately 50 percent of mobilization requirements. To execute such a program, $40 million of engineering design funds in fiscal year 1987 and fiscal year 1988 would be required.

Senator HUMPHREY. You mentioned deficiencies in the Government-owned facilities, should these be funded now? By funding these deficiencies, would the plants be fully ready for mobilization or are those additional requirements?

General MOLINELLI. Not all of the deficiencies in the Government-owned facilities should be funded at this item. Following the example provided above, the deficiencies for pacing components should be funded first. If all the deficiencies in the current facilities were funded, there would remain significant production base shortfalls.

Senator HUMPHREY. Are all your Government-owned facilities needed?

General MOLINELLI. A recent study has shown that even if all existing facilities were operational and all available land was fully utilized by constructing additional facilities, a shortfall still would exist to meet full mobilization requirements. The study further indicated that four additional plant complexes are needed to meet all known requirements.

Senator HUMPHREY. Some supporters of the short-war theory feel that the production base is of no value since it reacts too slowly. What are your comments?

General MOLINELLI. Given an intensive world-wide war scenario with no warning, the present production base could not respond to meet wartime requirements for 6 months or longer. Even under such intensive short-war scenarios, the production base may still be extremely valuable for, as outlined by BG John Hackett in his book Third World War, Aug. 1983, after the end of a short-war, stockpiles must be rapidly rebuilt to serve as a deterrent to continued aggression. On the other hand, if there is a warning period or the war is not as intensive; then the production base would be greatly effective.

Senator HUMPHREY. You have 157 commercial producers with mobilization planning, yet you deal with over 500 commercial contractors. Why do you not have mobilization agreements with all the contractors? Do you need more capacity in industry to produce under mobilization? What initiatives are you taking to reduce the shortfall in commercial producers?

General MOLINELLI. The Army, in an attempt to effectively utilize its resources, only conducts mobilization planning for the most critical items and components. If an item or component is commercially available to provide sufficient quantities with required lead times, no planning is considered necessary. The 157 commercial contractors which are mobilization planned are considered necessary. The 157 commercial contractors which are mobilization planned are producers of those critical items/components for which there is inadequate commercial capability.

Senator HUMPHREY. Have you provided facilities for other Services? What kind?

General MOLINELLI. Army production base support funding has provided production facilities for numerous Air Force and Navy items. The following are some of the items that facilities have been provided or planned: Bigeye Bomb BLU-80/B, FMU 139 Electronic Fuze, MK83 1000 LB Bomb, PBX Bomb Facility, 16"/50 Projectile, 76mm/3"/5" Projectile, Gator, Combined Effects Munition, and Tactical Munitions Dispenser. The Marine Corps makes use of Army facilities for the majority of their procurements. In addition, many explosive components, small caliber and medium caliber items support multiple Services.

Senator HUMPHREY. How would you execute the projects? Can you do them all at once or incrementally? Can you execute any of them now if you received funding? How many? How long would it take to complete some representative projects? Which would you do first? Why?

General MOLINELLI. To improve the production base, projects should be funded to improve the critical pacing components for those items which have the greatest production shortfalls. This method increases capacity for the least amount of funds by balancing the production base. A study was conducted to indicate how $500M per year could be used on the philosphy. A five hundred million dollar program currently is not executable due to inadequacy of design however there is an ongoing effort to update the study and provide optimum projects assuming prior years availability of design funds. The objective of this program is to attempt to bring all critical ammunition items to a level of 50 percent of their mobilization requirements.

Senator HUMPHREY. If you were given monies to improve the readiness of the base, how many dollars could you execute by year? What are the limiters?

General MOLINELLI. It is estimated approximately $500 million in excess of current program would be executable. Limiters would largely consist of the capacity of peacetime industry to support the unique equipment requirements, management ability and non-interference with existing production schedules.

Senator **Humphrey**. General, in your opinion, why do you think ammunition funding is constrained to the degree it is?

General **Molinelli**. Within a constrained TOA there is a prioritization of all the Army's requirements, to include ammunition production base, for peace-time, surge and mobilization needs. According to priorities established, ammunition production base has been receiving an appropriate amount of available funds.

[Whereupon, at 2:43 p.m., the subcommittee was adjourned.]

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